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A Revision of the Spider Genera *Drassodes* and *Tivodrassus* (Araneae, Gnaphosidae) in North America

NORMAN I. PLATNICK¹ AND MOHAMMAD U. SHADAB²

ABSTRACT

Seven North American species of *Drassodes* and four of *Tivodrassus* are diagnosed and described. The usefulness of various genitalic characters for species discrimination in *Drassodes* is discussed. Five new species are described: *D. mirus* from the Rocky Mountains, *D. angulus* from California, and *T. pecki*, *T. reddelli*, and *T. farias* from Mexico. *Drassodes saccatus* (Emerton) is removed from the synonymy of *D. neglectus* (Keyserling) and considered a valid species.

Five specific names are newly synonymized: *D. phanus* (Chamberlin) and *D. yavapainus* (Chamberlin), both with *D. gosiutus* Chamberlin; and *D. centralis* F. O. P.-Cambridge, *D. celes* Chamberlin, and *D. robinsoni* Chamberlin, all with *D. saccatus* (Emerton). The males of *D. louisianus* Roddy and *T. ethophor* Chamberlin and Ivie are described for the first time. *Drassodes perditus* Banks is transferred to *Herpyllus*.

INTRODUCTION

The present paper, the fifth in a series on the spider family Gnaphosidae, is concerned with the genera *Drassodes* and *Tivodrassus* in North America; these two genera are not closely related, but both seem to be without close relatives among the other Nearctic gnaphosids. *Drassodes*, established by Westring (1851) for the Palaearctic species *D. lapidosus* (Walckenaer) and easily recognized by the deeply notched trochanters (fig. 17) and characteristic genitalia (figs. 5-8), has had a complicated nomenclatural history. Early in the history of arachnology, virtually all gnaphosids were placed in a single genus, *Drassus*. When *Drassus* was subsequently shown to be an ob-

jective junior synonym of *Gnaphosa*, most of its species were collectively transferred to *Drassodes*, with the result that the catalogues of Roewer (1954) and Bonnet (1956) list around 200 species of the genus from all over the world. Of these names, probably less than half actually belong to *Drassodes*. For example, at least eight species have been described from South America, but not a single specimen congeneric with *D. lapidosus* has been found in the South American collections available to us, and those species of which the types have been readily available, such as *D. agelastus* (Keyserling) from Brazil and *D. araucanius* Chamberlin from Peru, definitely do

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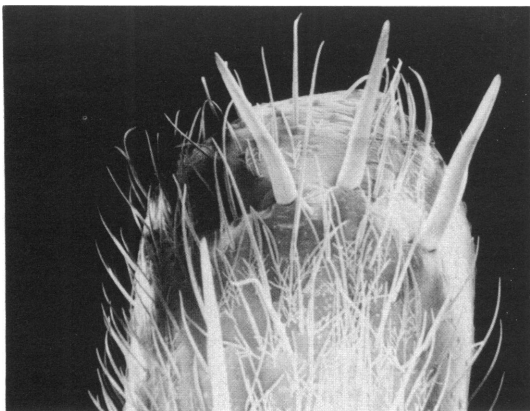
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not belong to the genus. Ascertaining the correct placement of all these older names would be a lengthy, difficult, and in many cases (where types are unavailable or their depository is unknown) probably impossible task. We have therefore confined our attention to the *Drassodes* described from and occurring in North America. *Tivodrassus*, on the other hand, was established by Chamberlin and Ivie (1936) on the basis of a single female from Guerrero, Mexico, differing from all other known North American gnaphosids in having greatly reduced anterior median eyes. Additional specimens described below, including the first known males of the genus, indicate that there are at least four species and that the genus is widespread in Mexico.

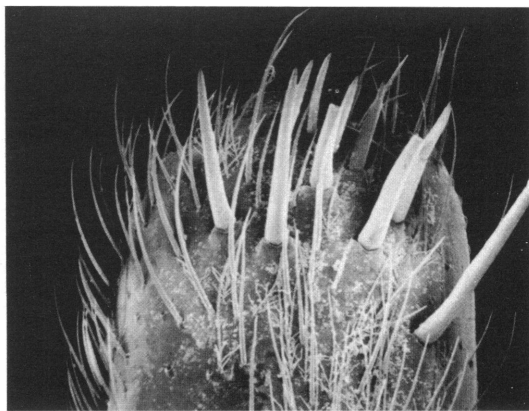
Drassodes is probably the taxonomically most difficult of the Nearctic gnaphosid genera. The genitalia of both sexes are extremely simple and highly variable, a combination of attributes which has led to much disagreement among arachnologists as to the number of species present in other faunas, even in limited areas like England (compare the treatment of *Drassodes* in Locket and Millidge, 1951, and Locket, Millidge, and Merrett, 1974). Chamberlin (1919a, 1919b, 1922, 1925) described numerous American species on the basis of very slight genitalic differences shown by single specimens. If differences of that order of magnitude were utilized as specific characters and applied to the bulk of American *Drassodes* collections presently available (most of which consist of single specimens from a given locality), a large number of very poorly defined species with almost no geographic correlations would have to be accepted. Fortunately we have had access to a few extensive pitfall trap collections from single localities over an entire collecting season. These collections, made mostly by Dr. Daniel T. Jennings of the Rocky Mountain Forest and Range Experiment Station, United States Department of Agriculture, show that some genitalic characters vary widely in individuals taken in the same pitfall trap at the same time and that much more pronounced differences exist between temporally isolated populations at a given site. For example, a series of traps set two miles northeast of the University of Albuquerque, Bernalillo County, New Mexico,

and emptied weekly between late April and early November, 1973, captured large numbers of *Drassodes saccatus* (Emerton) between April 29 and July 29 as well as fewer *Drassodes gosiutus* Chamberlin between October 29 and November 4. On this basis, we have considered that variation in the number and arrangement of the teeth on the retrolateral tibial apophysis of males (figs. 18-20) and in the shape of the epigynal midpiece (figs. 45-48) found in series of specimens taken together at one time is individual rather than specific. We have used instead characters such as the shape of the embolus and the lateral epigynal margins that separate the temporally isolated populations to distinguish what we believe to be the valid biological species of *Drassodes*. In addition, one nongenitalic character (the dorsodistal spination of the palpal femur) proved to be of great value, particularly as the spination often agrees in both sexes of a given species.

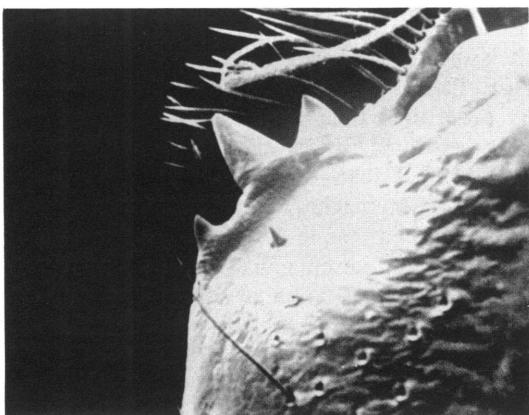
A detailed analysis of the phylogeny of the American *Drassodes* can reveal little until the Old World representatives of the genus are studied and included, but some comments regarding their interrelationships are possible. Unlike *Gnaphosa* and *Haplodrassus*, none of the American *Drassodes* appear to have amphi-Atlantic distributions; only *D. louisianus* Roddy seems to have close genitalic similarities (a medially situated embolus and reduced retrolateral tibial apophysis) to a known European species, *D. lutescens* (C. L. Koch). Both the distribution (map 2) and apparently obligatory synanthropic habits of *D. louisianus* indicate that it may be an introduced species. The presence of five or more dorsodistal spines on the palpal femur of male *D. saccatus*, *D. auriculoides*, and *D. angulus* is apparently an autapomorphic character separating those species from the other known *Drassodes*. The three remaining American species are not united by any autapomorphic character yet discovered; each is anomalous in genitalic characters (the elongate embolus and coiled spermathecae of *D. mirus*, the sinuous embolus of *D. gosiutus*, and the shortened lateral epigynal margins of *D. neglectus*) and may well have had an independent origin. Nothing can be said of the relationships of the known *Tivodrassus* species until the males of



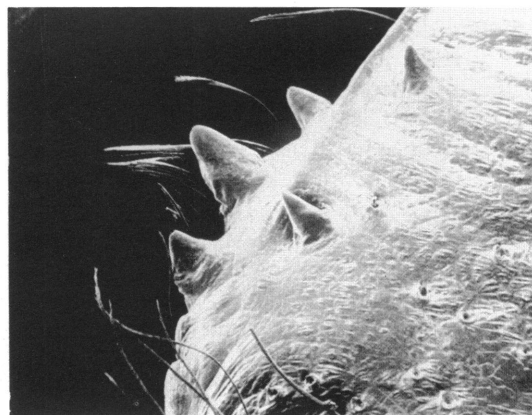
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FIGS. 1-4. Scanning electron micrographs. 1, 2. Dorsal view of distal ends of palpal femora, 100 \times . 1. *Drassodes neglectus* (Keyserling). 2. *D. saccatus* (Emerton). 3, 4. Posterior views of cheliceral teeth, 130 \times . 3. *D. neglectus* (Keyserling). 4. *D. gosiutus* Chamberlin.

T. reddelli or *T. farias* are discovered. The reduced anterior median eyes suggest a possible relationship between *Tivodrassus* and the six-eyed Neotropical genus *Lygromma*, but a revision of *Lygromma* is needed before conclusions can be reached. Both the presence in male *Tivodrassus* of a paracymbium (a structure that may not be homologous to the paracymbium of Araneoidea but is nonetheless widespread in the Anagraphinae, where *Lygromma* is placed) and the existence of a South American anagraphine genus, *Pseudolygromma*, with similarly reduced anterior median eyes but slightly different

genitalia, support the possibility of this relationship.

The format of the descriptions and standard abbreviations of morphological terms follow those used by Platnick and Shadab (1975a). Unpaired ventral spines on the tibiae and metatarsi are indicated as being either prolateral (p) or retrolateral (r) in position. In view of the fact that the value of detailed locality records is inversely correlated with their abundance, three styles of presenting this information have been adopted. For widespread and abundant species only county records within the United States are

given, for less common or more restricted species specific records are presented, and for rare or localized species complete data, including depositories (abbreviated as indicated below), are provided.

The 1700 adult *Drassodes* and 16 adult *Tivodrassus* used in the present study were obtained from the large collections of the American Museum of Natural History (AMNH) and from the following curators and collectors, to each of whom we are greatly indebted: Drs. D. Barr, Royal Ontario Museum; D. E. Bixler (DEB); J. E. Carico; C. D. Dondale, Canadian National Collections (CNC); R. L. Fischer, Michigan State University; W. D. Fronk (WDF); D. T. Jennings; B. J. Kaston; R. E. Leech (REL); H. W. Levi, Museum of Comparative Zoology (MCZ); W. B. Peck, Exline-Peck Collection (EPC); R. X. Schick, formerly of the California Academy of Sciences; E. I. Schlinger and C. Griswold, University of California, Berkeley; W. Sedgwick (WS); W. A. Shear; C. A. Triplehorn and A. J. Penniman, Ohio State University (OSU); D. Ubick; H. K. Wallace (HKW); F. R. Wanless and P. Hillyard, British Museum (Natural History) (BMNH); and H. V. Weems, Jr., Florida State Collection of Arthropods (FSCA). Special thanks go to Dr. Willis J. Gertsch, who made many of the *Tivodrassus* specimens available for study, and to Mr. Robert J. Koestler for his patient assistance in obtaining the scanning electron micrographs from a sometimes recalcitrant machine.

DRASSODES WESTRING

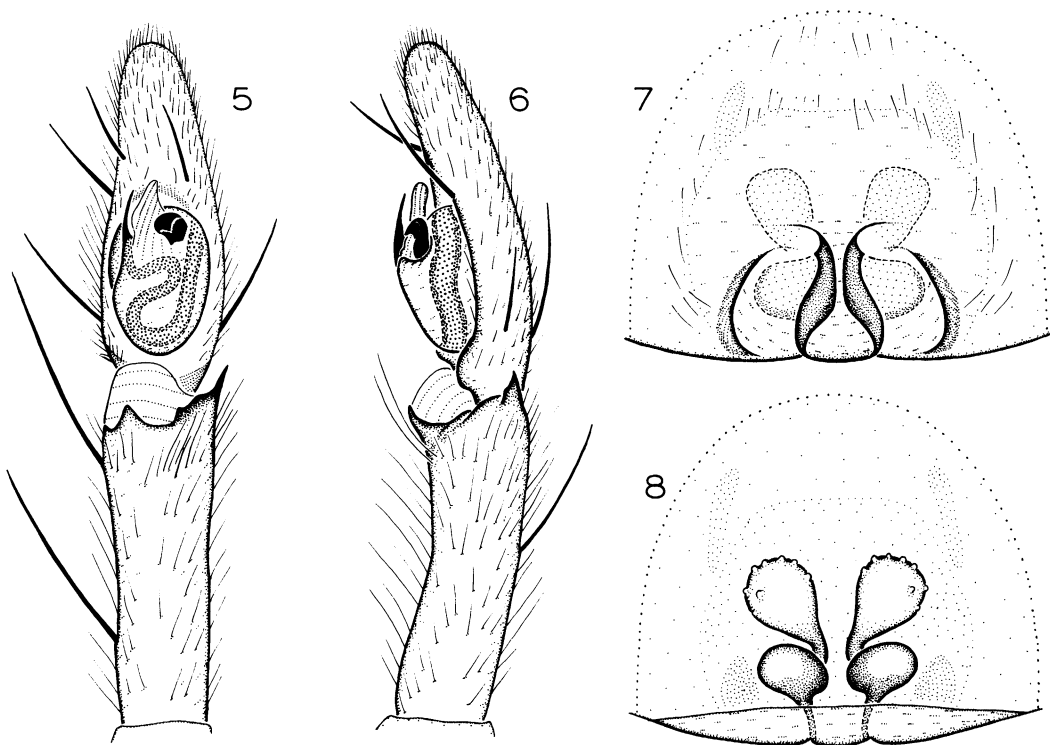
Drassodes Westring, 1851, p. 48 (type species by monotypy *Aranea lapidosa* Walckenaer). Roewer, 1954, p. 384. Bonnet, 1956, p. 1556. *Geodrassus* Chamberlin, 1922, p. 159 (type species by original designation *Drassodes gosiutus* Chamberlin). Roewer, 1954, p. 398. Bonnet, 1957, p. 1987. First synonymized by Ubick and Roth, 1973.

Diagnosis. *Drassodes* may be easily distinguished from the other Nearctic gnaphosids by the presence of deeply notched trochanters (fig. 17), and often by the characteristic genitalia (figs. 5-8). Specimens of two other genera can be confused with *Drassodes* on genitalic characters alone, however: some *Herpyllus* males have palpi

resembling those of *D. gosiutus* but can be separated by their well-developed retrolateral tibial apophysis, and some *Litopyllus* females have genitalia indistinguishable from those of *Drassodes* (a symplesiomorphic similarity; males of *Litopyllus* have very different genitalia and neither sex has deeply notched trochanters).

Description. Total length 3.8-11.6 mm. Carapace almost rectangular in dorsal view, widest between coxae II and III, only slightly narrowed in front, light brown with dusky radiations from thoracic groove, with recumbent black and scale-like white setae. Cephalic area only slightly elevated; thoracic groove longitudinal. From front, both eye rows procurved. PME irregularly square, ALE and PLE oval, AME circular; PME usually largest. AME separated by more than their diameter, by less than their diameter from ALE. PME separated by less than their diameter, by more than their diameter from PLE. Lateral eyes separated by more than their diameter. MOQ longer than wide, wider in back than in front. Clypeal height greater than AME diameter. Chelicerae with three or four promarginal teeth and one to six retromarginal denticles (figs. 3, 4). Endites with deep oblique depression. Labium truncate anteriorly. Sternum with sclerotized extensions to coxae. Leg formula 4123. Tarsi with two dentate claws and claw tufts. Metatarsal preening comb lacking. Trochanters deeply notched (fig. 17). Metatarsi I and II and all tarsi scopulate. Typical leg spination pattern (only surfaces bearing spines listed): femora: I, II d1-1-0, p0-0-1; III, IV d1-1-1, p0-1-1, r0-1-1; tibiae: I, II v0-1p-0; III d1-0-0, p1-1-1, v1p-1p-2, r0-1-1; IV d1-1-0, p1-1-1, v1p-2-2, r1-1-1; metatarsi: I, II v1p-0-0; III p1-2-2, v2-2-2, r1-1-2; IV p1-2-2, v2-2-2, r2-2-2. Abdomen brownish gray, long, narrow, without scutum, with anterior tuft of hairs. Six spinnerets, anteriors widely separated, with six or seven spigots. Palp with narrow, serrate retrolateral tibial apophysis (sometimes reduced), short embolus (greatly elongated in *D. mirus*), transparent unsclerotized conductor, and hooklike median apophysis (figs. 5, 6). Epigynum with midpiece and curved lateral margins (fused in *D. neglectus*); spermathecae with distinct basal and distal lobes (figs. 7, 8).

Misplaced Species. Examination of a male syntype (MCZ) of *Drassodes perditus* Banks (1898) indicates that the species actually belongs



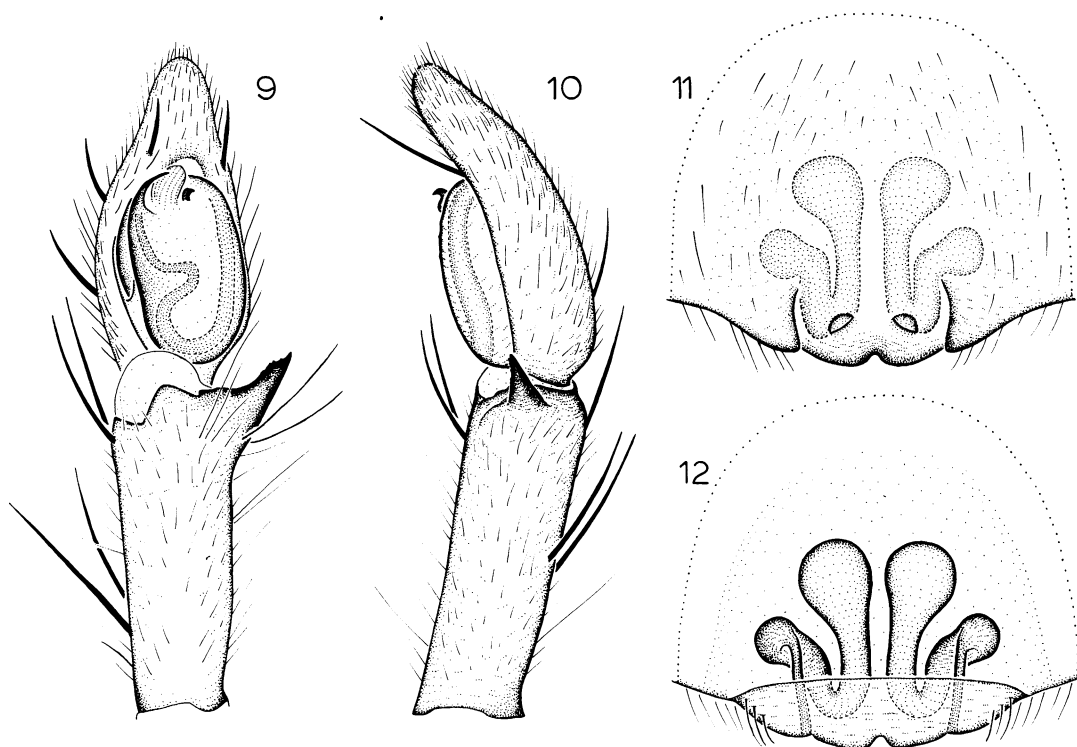
FIGS. 5-8. *Drassodes lapidosus* (Walckenaer). 5. Palp, ventral view. 6. Palp, retrolateral view. 7. Epigynum, ventral view. 8. Vulva, dorsal view.

to *Herpyllus*. The trochanters are not deeply notched and the retrolateral tibial apophysis and palpal bulb are within the range shown by species currently placed in *Herpyllus*.

Uncertain Names. Of the North American species described in *Drassus* or *Drassodes* and not subsequently removed to other genera (see Ubick and Roth, 1973, and Platnick and Shadab, 1975b), five are too poorly described to be recognizable, have type specimens that are either lost or destroyed, and are here considered *nomina dubia*: *Drassus pallidipalpis* Bilimek (1867), *Drassus hunterae* Blackwall (1871), *Drassus cacahuamilpensis* Herrera (1892), *Drassus orizaba* Banks (1898), and *Drassus singularis* Banks (1898).

KEY TO SPECIES OF *DRASSODES* IN NORTH AMERICA

- | | |
|--|---|
| 1. Males | 2 |
| Females | 8 |
| 2. Retrolateral tibial apophysis long, narrow, serrate (as in fig. 9) 4 | |
| Retrolateral tibial apophysis short, reduced to low flat lobe (figs. 30, 34, 58) 3 | |
| 3. Embolus sinuous (figs. 29, 33) <i>gosiutus</i> | |
| Embolus straight (fig. 57) <i>louisianus</i> | |
| 4. Palpal femur with three dorsodistal spines (as in fig. 1) 5 | |
| Palpal femur with five or more dorsodistal spines (as in fig. 2) 6 | |
| 5. Embolus as long as palpal bulb (figs. 21, 25) <i>mirus</i> | |
| Embolus much shorter than palpal bulb (figs. 9, 13) <i>neglectus</i> | |
| 6. Embolus separated from prolateral side of tegulum by unsclerotized strip; palpal duct with coil immediately below embolus origin (fig. 61) <i>angulus</i> | |
| Embolus not separated from prolateral side of tegulum; palpal duct without coil immediately below embolus origin (figs. 37, 49) 7 | |
| 7. Median apophysis relatively close to embolus; embolus relatively straight, closely | |



FIGS. 9-12. *Drassodes neglectus* (Keyserling). 9. Palp, ventral view. 10. Palp, retrolateral view. 11. Epigynum, ventral view. 12. Vulva, dorsal view.

- appressed to tegulum (figs. 37, 38, 41) *saccatus*
 Median apophysis relatively far from embolus; embolus relatively curved, protruding ventrally from tegulum (figs. 49, 50, 53) *auriculoides*
8. Spermathecae coiled (figs. 24, 28) *mirus*
 Spermathecae bent but not coiled (as in figs. 12, 16) 9
9. Chelicerae with one retromarginal denticle (fig. 4). *gosiutus*
 Chelicerae with two or more retromarginal denticles (as in fig. 3) 10
10. Lateral epigynal margins fused with midpiece (figs. 11, 15). *neglectus*
 Lateral epigynal margins separated from midpiece (figs. 39, 51, 59, 63) 11
11. Epigynal midpiece with parallel sides, close to lateral margins (fig. 59). *louisianus*
 Epigynal midpiece with sides not parallel or far from lateral margins (figs. 39, 51, 63). 12
12. Lateral epigynal margins widely separated, forming a large circle (figs. 51, 55) *auriculoides*
 Lateral epigynal margins not widely separated, not forming a large circle (figs. 39, 63) 13
13. Spermathecae on short stalks, with basal and terminal lobes approximate (figs. 40, 44) *saccatus*
 Spermathecae on long stalks, with basal and terminal lobes widely separated (figs. 64, 68) *angulus*
- Drassodes lapidosus* (Walckenaer)
 Figures 5-8
- Drassodes lapidosus*: Roewer, 1954, p. 387. Bonnet, 1956, p. 1570.
- Illustrations of the genitalia of this European species, the type species of *Drassodes*, are provided for purposes of comparison with the



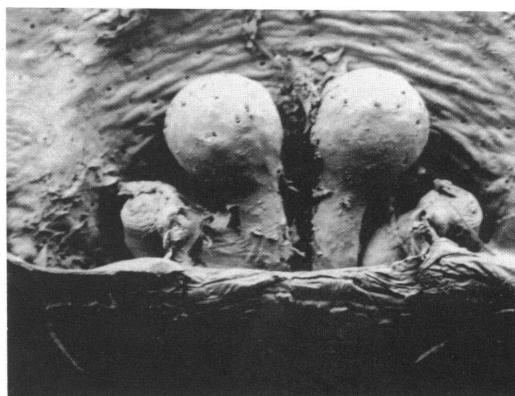
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FIGS. 13-16. *Drassodes neglectus* (Keyserling). 13. Embolar region of palp, ventral view, 260X. 14. Retrolateral tibial apophysis, ventral view, 650X. 15. Epigynum, ventral view, 200X. 16. Vulva, dorsal view, 130X.

Nearctic members of the genus. The specimens illustrated are from England (AMNH).

Drassodes neglectus (Keyserling)

Figures 1, 3, 9-20; Map 1

Drassus neglectus Keyserling, 1887, p. 434, pl. 6, fig. 10 (female holotype from the United States, no specific locality, in MCZ, examined).

Drassus humilis Banks, 1892, p. 20, pl. 1, fig. 60 (two female syntypes from Ithaca, Tompkins County, New York, in MCZ, examined). First synonymized by Banks, 1916.

Drassus inornatus Banks, 1895, p. 420 (female

holotype from Westcliffe, Custer County, Colorado, in MCZ, examined). First synonymized by Chamberlin, 1922.

Drassodes neglectus: Comstock, 1903, p. 18. Roewer, 1954, p. 397. Bonnet, 1956, p. 1582.

Diagnosis. *Drassodes neglectus* is a distinctive species easily recognized by the fused epigynal midpiece and lateral margins of females (fig. 11) and the combined presence of three dorsodistal spines on the palpal femur, a short embolus, and a long serrate retrolateral tibial apophysis (figs. 1, 9) in males.

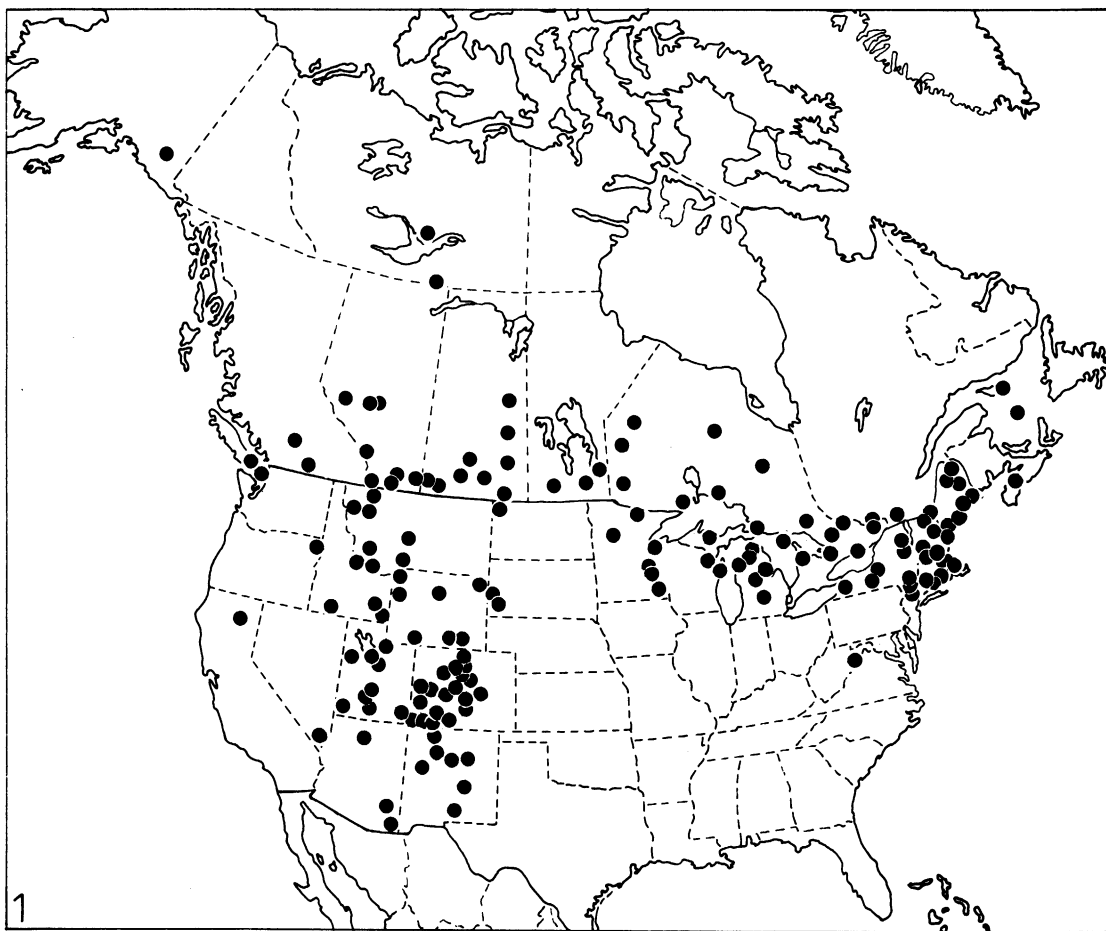
Male. Total length 6.54±1.01 mm. Carapace 2.82±0.44 mm. long, 2.02±0.32 mm. wide.

Femur II 2.30 ± 0.33 mm. long (288 specimens examined). Chelicerae with two retromarginal denticles. Palpal femur with three dorsodistal spines. Eye sizes and interdistances (mm.): AME 0.11, ALE 0.14, PME 0.16, PLE 0.13; AME-AME 0.18, AME-ALE 0.10, PME-PME 0.12, PME-PLE 0.32, ALE-PLE 0.20. MOQ length 0.48 mm., front width 0.41 mm., back width 0.43 mm. Embolus short, acutely curved (figs. 9, 13). Retrolateral tibial apophysis long, variably serrate (figs. 10, 14, 18-20). Leg spination: tibia III p0-1-1.

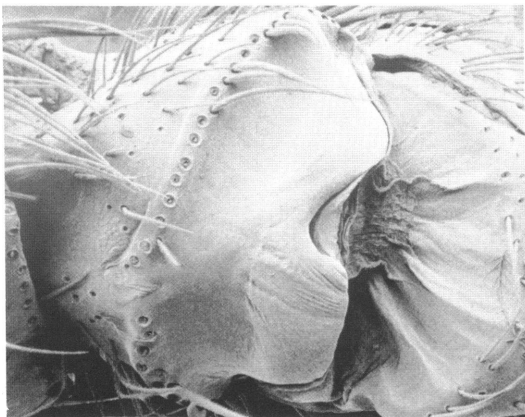
Female. Total length 9.51 ± 0.72 mm. Carapace 3.42 ± 0.24 mm. long, 2.43 ± 0.17 mm. wide. Femur II 2.41 ± 0.15 mm. long (649 specimens examined). Chelicerae and palpal spination as in

male. Eye sizes and interdistances (mm.): AME 0.11, ALE 0.13, PME 0.14, PLE 0.12; AME-AME 0.17, AME-ALE 0.07, PME-PME 0.09, PME-PLE 0.26, ALE-PLE 0.16. MOQ length 0.46 mm., front width 0.38 mm., back width 0.37 mm. Lateral epigynal margins fused with mid-piece, shortened (figs. 11, 15). Spermathecae elongate (figs. 12, 16). Leg spination: femur IV r0-0-1.

Records. Canada: Alberta: Banff; Bow Island; Carthew Lakes; Del Bonito; Edmonton; Elkwater Lake Provincial Park; Foremost; Fort MacLeod; Gorge Creek; Medicine Hat; Peace River; Seba; Seven Persons; Stirling; Waterton Lakes Provincial Park. *British Columbia:* Arlin; Nanaimo Lakes; Oliver; Vernon; Wellington. *Mackenzie:*



MAP 1. North America, showing distribution of *Drassodes neglectus*.



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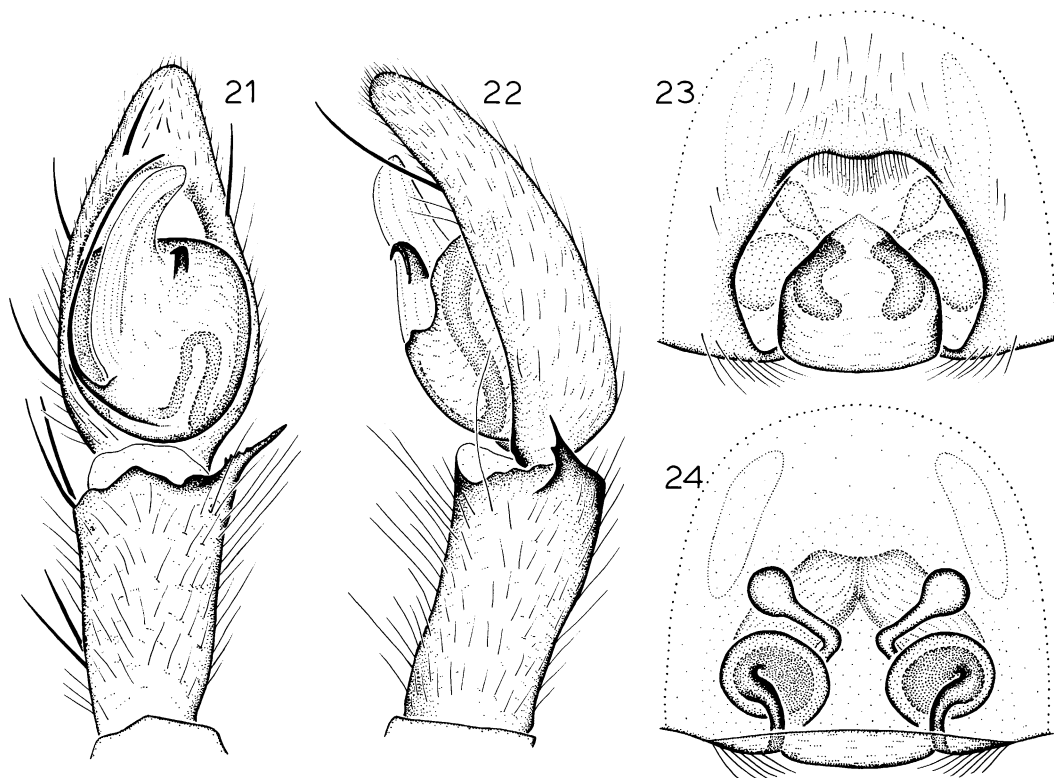


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FIGS. 17-20. *Drassodes neglectus* (Keyserling). 17. Trochanter IV, showing notch, ventral view, 125X. 18-20. Retrolateral tibial apophyses, ventral views, 600X, variants from three specimens collected in single pitfall trap, Carbon County, Wyoming.

Cameron River; Fort Smith. *Manitoba*: Glenlea; Roblayton; Spruce Woods Provincial Park; Victoria Beach. *Nova Scotia*: Coldbrook; Hatt's Harbour; Kentville. *Ontario*: Batchawana; Callander; Chatterton; Desbarats; Favourable Lake; Huntsville; Kingston; Lake Nipissing; Lake Opeongo; Latta; Manitoulin Island; Marathon; Minaki; Moth Lake; Muswabik River; Orillia; Ottawa; Pointe au Baril; Port Arthur; Rednersville; Saint Ola; Shannonville; Smoky Falls; Sudbury; Wellington; Woman River. *Quebec*: Anticosti Island; Coffin Island; Gatineau National Park; Hull; Lanoraie; Montreal. *Saskatchewan*: Balgonie; Bienfait; Buffalo Pound Provincial Park; Chaplin Lake; Claydon; Cypress

Hills Provincial Park; Estevan; Gull Lake; Herbert; Katepwa Lake; Lady Lake; Pasqua; Regina; Saskatoon; Strasbourg. **United States** (county records): *Alaska*: Kennicott. *Arizona*: Cochise, Coconino, Graham. *California*: Shasta. *Colorado*: Archuleta, Boulder, Chaffee, Clear Creek, Custer, Delta, Eagle, El Paso, Fremont, Grand, Gunnison, Hinsdale, Jefferson, Lake, La Plata, Larimer, Mesa, Montezuma, Montrose, Rio Grande, San Juan. *Connecticut*: Hartford, Litchfield, New Haven, Windham. *Idaho*: Bannock, Bear Lake, Lemhi, Twin Falls. *Maine*: Aroostook, Cumberland, Hancock, Knox, Lincoln, Penobscot, Piscataquis, Washington, York. *Massachusetts*: Essex, Middlesex, Norfolk.



FIGS. 21-24. *Drassodes mirus*, new species. 21. Palp, ventral view. 22. Palp, retrolateral view. 23. Epigynum, ventral view. 24. Vulva, dorsal view.

Michigan: Arenac, Charlevoix, Cheboygan, Clinton, Leelenau, Marquette, Midland. **Minnesota:** Koochiching, Wabasha. **Montana:** Beaverhead, Flathead, Granite, Lake, Meagher, Park, Sanders. **Nevada:** Clark. **New Hampshire:** Carroll, Cheshire, Coos, Grafton, Hillsborough. **New Mexico:** Lincoln, Otero, Rio Arriba, Sandoval, San Miguel, Santa Fe, Valencia. **New York:** Erie, Essex, Greene, Onondaga, Orange, Rockland, Tompkins, Ulster, Warren. **North Dakota:** Divide. **Oregon:** Wallowa. **South Dakota:** Custer, Lawrence, Pennington. **Utah:** Garfield, Iron, Piute, Salt Lake, San Juan, Sevier, Summit, Tooele, Utah. **Vermont:** Essex, Windham, Windsor. **Washington:** San Juan. **West Virginia:** Pendleton. **Wisconsin:** Door, Douglas, Marinette, Pierce, Polk. **Wyoming:** Albany, Carbon, Crook, Sweetwater, Teton, Washakie, Yellowstone National Park.

Distribution. Alaska to Nova Scotia, south to Arizona and West Virginia (map 1).

Natural History. Mature males and females have been taken from March through October at elevations up to 13,100 feet, under bark and rocks; in fields; on talus slopes; associated with lodgepole, ponderosa, and jack pine, blue spruce, douglas fir, juniper, scrub oak, birch, sagebrush, and sphagnum; among pebbles on a beach; and in houses.

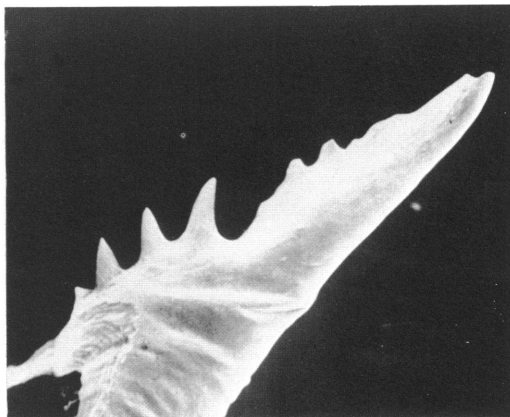
***Drassodes mirus*, new species**
Figures 21-28; Map 2

Types. Male holotype and female paratype from pitfall trap in alpine tundra, elevation 12,000 feet, Rocky Mountain National Park, Larimer County, Colorado (July 5-15, 1966; D. E. Bixler), deposited in AMNH, courtesy of Dr. Bixler.

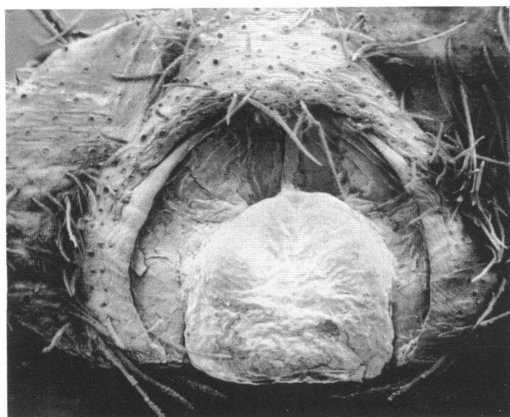
Etymology. The specific name is from the Latin *mirus* (extraordinary), referring to the unique modifications of the genitalia.



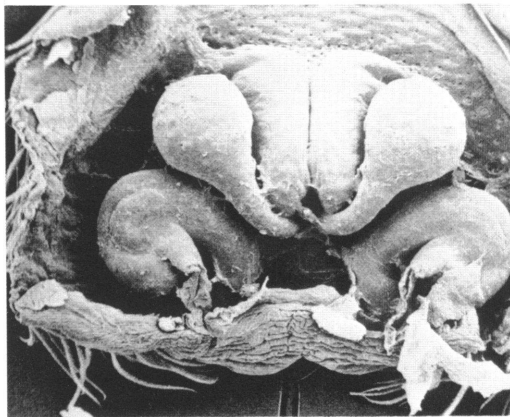
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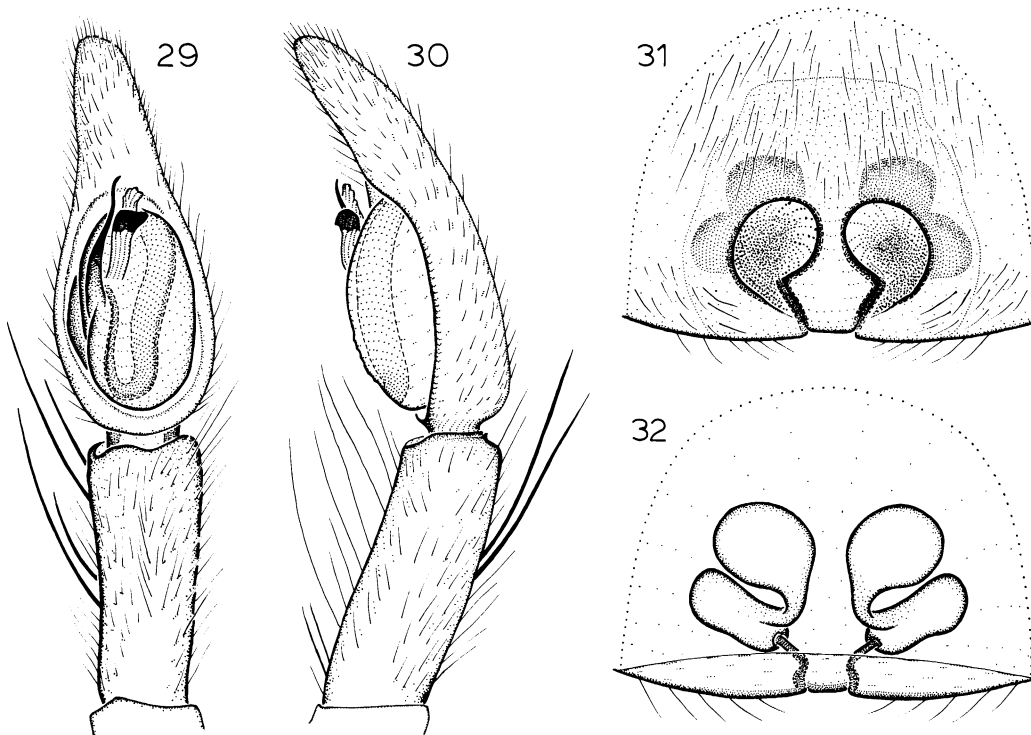
FIGS. 25-28. *Drassodes mirus*, new species. 25. Embolar region of palp, ventral view, 200X. 26. Retrolateral tibial apophysis, ventral view, 375X. 27. Epigynum, ventral view, 100X. 28. Vulva, dorsal view, 200X.

Diagnosis. *Drassodes mirus* is a distinctive species easily recognized by the extremely long embolus of the male (figs. 21, 25) and the coiled spermathecae and large epigynal atrium of the female (figs. 23, 24, 27, 28).

Male. Total length 6.37±0.89 mm. Carapace 2.99±0.36 mm. long, 2.14±0.25 mm. wide. Femur II 2.15±0.19 mm. long (12 specimens examined). Chelicerae with two retromarginal denticles. Palpal femur with three dorsodistal spines. Eye sizes and interdistances (mm.): AME 0.11, ALE 0.12, PME 0.13, PLE 0.12; AME-AME 0.17, AME-ALE 0.09, PME-PME 0.13, PME-PLE 0.30, ALE-PLE 0.20. MOQ length 0.44 mm., front width 0.38 mm., back width 0.40

mm. Embolus longer than palpal bulb (figs. 21, 25). Retrolateral tibial apophysis narrowed distally (figs. 22, 26). Leg spination typical for the genus.

Female. Total length 6.95-8.86 mm. Carapace 2.97-3.61 mm. long, 2.16-2.50 mm. wide. Femur II 1.91-2.57 mm. long (nine specimens). Chelicerae and palpal spination as in male. Eye sizes and interdistances (mm.): AME 0.10, ALE 0.11, PME 0.13, PLE 0.10; AME-AME 0.16, AME-ALE 0.08, PME-PME 0.09, PME-PLE 0.30, ALE-PLE 0.20. MOQ length 0.45 mm., front width 0.37 mm., back width 0.35 mm. Lateral margins of epigynum excavate, forming large atrium (figs. 23, 27). Spermathecae coiled (figs. 24, 28). Leg



FIGS. 29-32. *Drassodes gosiutus* Chamberlin. 29. Palp, ventral view. 30. Palp, retrolateral view. 31. Epigynum, ventral view. 32. Vulva, dorsal view.

spination: femur IV p0-0-1, r0-0-1; tibia III p0-1-1.

Material Examined. **Canada:** *Alberta:* Nordegg, June 25, 1968, elevation 4300 feet (R. E. Leech, REL), 1♀; 5 mi. E Waterton Lakes National Park, June 10-14, 1973, pitfall in grass (Redner and Starr, CNC), 1♂. **United States:** *Colorado:* Clear Creek Co.: Mt. Evans, June 21-July 6, 1967, elevation 12,100 feet, pitfall in mixed vegetation (R. Schmoller, MCZ), 1♀; July 6-18, 1967, elevation 13,200 feet, pitfall in *Carex elynoides* (R. Schmoller, AMNH), 3♂; July 18-31, 1967, same habitat (R. Schmoller, MCZ), 1♂, 1♀. Gilpin Co.: Rollinsville, July 6, 1973, elevation 11,500 feet, pitfall trap (K. Mowrer, WDF), 1♂. Larimer Co.: Rocky Mountain National Park, July 5-15, 1966, elevation 12,000 feet, pitfall in alpine tundra (D. E. Bixler, DEB), 4♂, 3♀; July 7-20, 1967, elevation 11,500 feet, pitfall in *Dryas* (R. Schmoller, AMNH), 1♀; Milner Pass, July 8, 1949 (W.J. and J.W.

Gertsch, AMNH), 1♀; Trail Ridge Road, June 16, 1964, elevation 12,000 feet, tundra (S.M. Sutton, AMNH), 1♂.

Distribution. Alberta and high mountains of Colorado (map 2).

Drassodes gosiutus Chamberlin

Figures 4, 29-36; Map 3

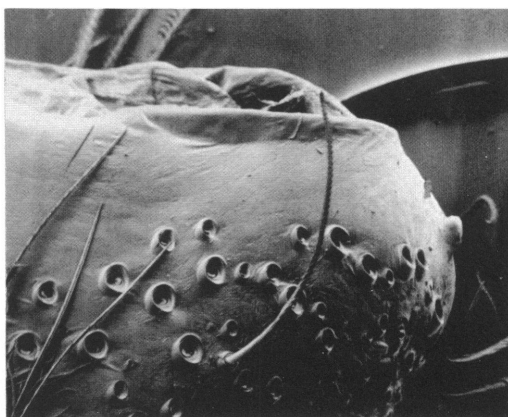
Drassodes gosiutus Chamberlin, 1919b, p. 245, pl. 16, fig. 3 (male holotype from Fillmore, Millard County, Utah, in MCZ, examined). Ubick and Roth, 1973, p. 1.

Geodrassus gosiutus: Chamberlin, 1922, p. 159. Roewer, 1954, p. 398. Bonnet, 1957, p. 1988. *Geodrassus phanus* Chamberlin, 1922, p. 159 (female holotype from Sea Cliff, Long Island, Nassau County, New York, in MCZ, examined). Roewer, 1954, p. 398. Bonnet, 1957, p. 1988. **NEW SYNONYMY.**

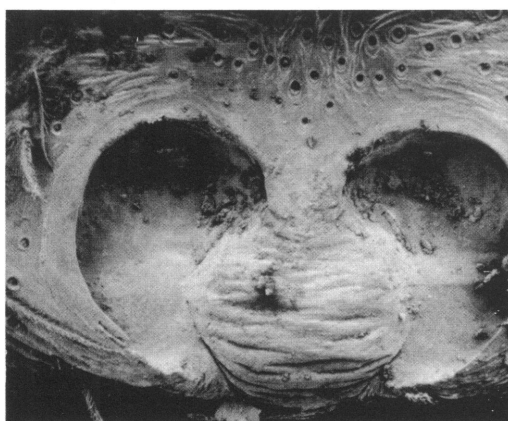
Geodrassus yavapaius Chamberlin, 1925, p. 213 (female holotype from Yavapai County,



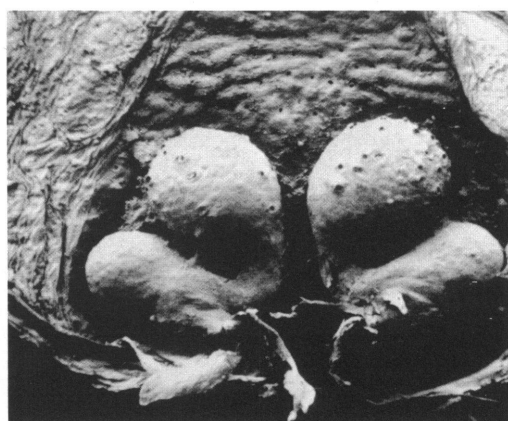
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FIGS. 33-36. *Drassodes gosiutus* Chamberlin. 33. Embolar region of palp, ventral view, 475X. 34. Retrolateral tibial apophysis, ventral view, 275X. 35. Epigynum, ventral view, 200X. 36. Vulva, dorsal view, 130X.

Arizona, in MCZ, examined). Roewer, 1954, p. 398. Bonnet, 1957, p. 1988. NEW SYNONYMY.

Geodrassus auriculoides (misidentification): Kaston, 1938, p. 175, figs. 5-8.

Drassodes phanus: Ubick and Roth, 1973, p. 1.

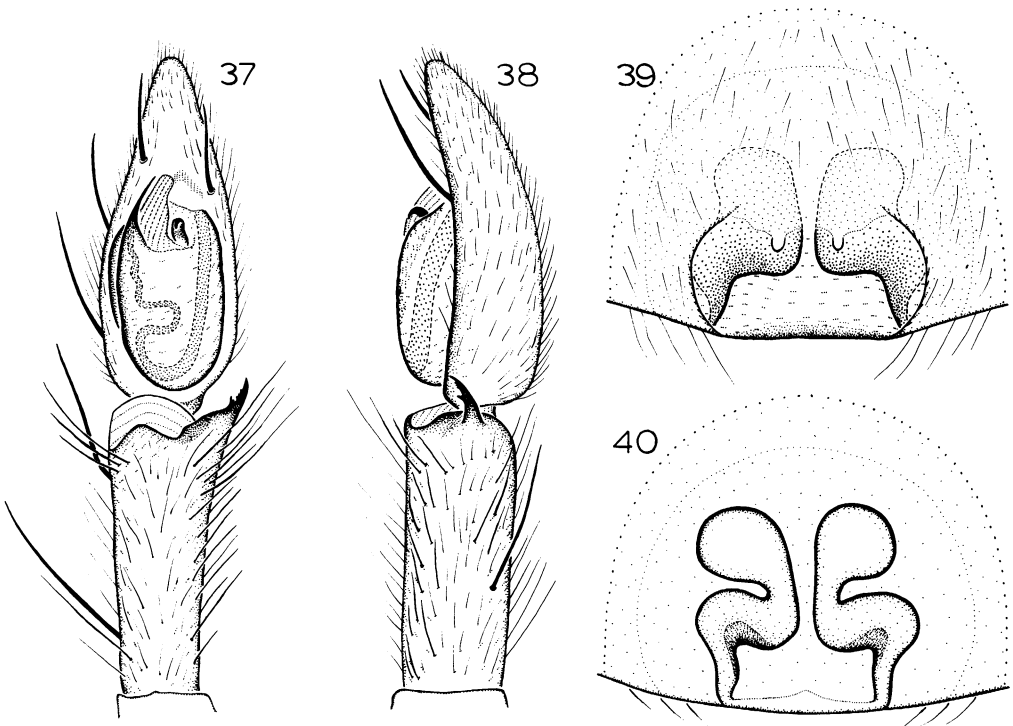
Drassodes yavapainus: Ubick and Roth, 1973, p. 1.

Diagnosis. *Drassodes gosiutus* is a distinctive species easily recognized by the presence of only one denticle on the cheliceral retromargin (fig. 4) and by the characteristic genitalia (figs. 29-36).

Male. Total length 7.91 ± 1.19 mm. Carapace 3.75 ± 0.44 mm. long, 2.67 ± 0.39 mm. wide. Femur II 2.85 ± 0.30 mm. long (111 specimens

examined). Chelicerae with one retromarginal denticle. Palpal femur with three dorsodistal spines. Eye sizes and interdistances (mm.): AME 0.12, ALE 0.12, PME 0.16, PLE 0.11; AME-AME 0.16, AME-ALE 0.07, PME-PME 0.05, PME-PLE 0.29, ALE-PLE 0.16. MOQ length 0.42 mm., front width 0.39 mm., back width 0.37 mm. Embolus sinuous (figs. 29, 33). Retrolateral tibial apophysis reduced to flat lobe (figs. 30, 34). Leg spination typical for the genus.

Female. Total length 8.71 ± 0.91 mm. Carapace 3.84 ± 0.41 mm. long, 2.71 ± 0.32 mm. wide. Femur II 2.68 ± 0.27 mm. long (80 specimens examined). Chelicerae and palpal spination as in

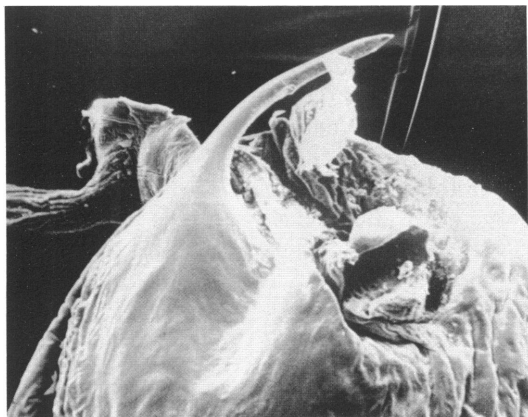


FIGS. 37-40. *Drassodes saccatus* (Emerton). 37. Palp, ventral view. 38. Palp, retrolateral view. 39. Epigynum, ventral view. 40. Vulva, dorsal view.

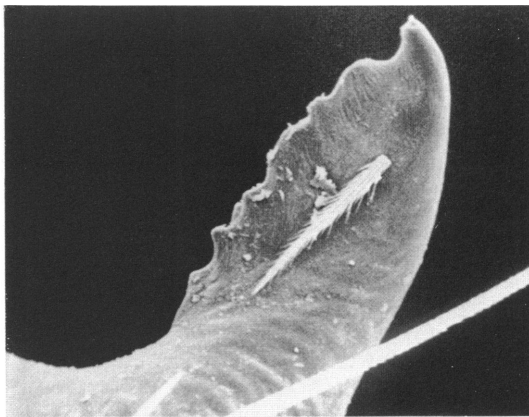
male. Eye sizes and interdistances (mm.): AME 0.15, ALE 0.15, PME 0.18, PLE 0.13; AME-AME 0.15, AME-ALE 0.08, PME-PME 0.08, PME-PLE 0.31, ALE-PLE 0.16. MOQ length 0.54 mm., front width 0.45 mm., back width 0.44 mm. Lateral epigynal margins continuous with midpiece, degree of sclerotization variable (figs. 31, 35). Spermathecae rotund (figs. 32, 36). Leg spination: femur IV r0-0-1.

Records. **Canada:** *Alberta:* Medicine Hat. **United States:** *Arizona:* Apache Co.: 12 mi. S Alpine. Cochise Co.: 12.2 mi. S Bowie; 3 mi. NE Portal. Coconino Co.: Sitgreaves National Forest. Pima Co.: Tucson. Santa Cruz Co.: Santa Rita Mountains. Yavapai Co. *Arkansas:* Washington Co.: Cove Creek. *Colorado:* El Paso Co.: Peyton Road. Fremont Co.: Wet Mountains. Pueblo Co.: Beulah Highway. *Connecticut:* New Haven Co.: Branford; Leete's Island. *Kansas:* Cowley Co.: Winfield. *Michigan:* Livingston Co.: E. S. George Reserve. *Mississippi:* Forrest Co.: Hattiesburg. *New Jersey:* Mercer Co.: Princeton. *New Mexico:*

Bernalillo Co.: Bosque del Rio Grande, Albuquerque. Grant Co.: Burrow Mountains; Hurley. Lincoln Co.: Carrizozo. Rio Arriba Co.: Chama. San Miguel Co.: Camp Luna, Las Vegas. Santa Fe Co.: Santa Fe. Valencia Co.: E Laguna. *New York:* Dutchess Co.: Wappingers Falls. Nassau Co.: Sea Cliff, Long Island. Ulster Co.: Saugerties. *Ohio:* Adams Co.: Lynx. Hocking Co.: Rockbridge. Jackson Co.: Jackson. *Oklahoma:* Cleveland Co.: Norman. Cotton Co.: Temple. Payne Co.: Stillwater. *Tennessee:* Blount Co.: CCC Camp, Great Smoky Mountains National Park. *Texas:* Archer Co.: 4 mi. SE Blackflat. Bandera Co. McCulloch Co.: Brady. *Utah:* Carbon Co.: Spring Creek, Helper. Emery Co.: Green River; Mud Springs. Millard Co.: Fillmore. Salt Lake Co.: Rotary Park, City Creek Canyon; Dry Canyon; Ensign Peak; 5 mi. SW Salt Lake City airport. San Juan Co.: E Monticello. Tooele Co.: Willow Creek. Utah Co.: W side of Utah Lake. *Wyoming:* Fremont Co.: Riverton; Shoshoni.



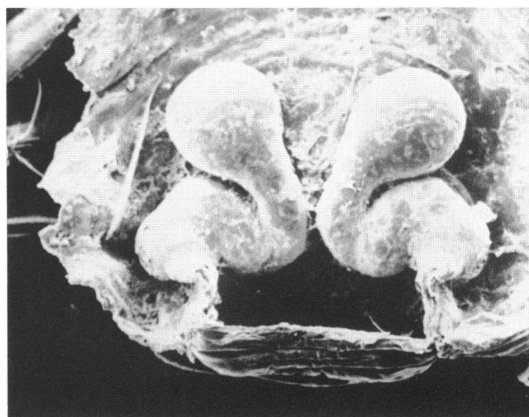
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FIGS. 41-44. *Drassodes saccatus* (Emerton). 41. Embolar region of palp, ventral view, 240X. 42. Retrolateral tibial apophysis, ventral view, 500X. 43. Epigynum, ventral view, 130X. 44. Vulva, dorsal view, 130X.

Distribution. Alberta to Connecticut, south to Arizona and Mississippi (map 3).

Natural History. Mature males have been taken from late June through late December, mature females year-round. Specimens have been collected at elevations up to 7000 feet, in pitfall traps in grassland; under trash and dry oak leaves; in houses; from the stomach of a toad; and associated with pinyon pine, juniper, nolina, yucca, allthorn, and mesquite.

Variation and Synonymy. Eastern females, including the type of *phanus*, tend to have wider epigynal midpieces and less heavily sclerotized lateral margins than do western females, but in light of the absence of detected differences in the

internal female genitalia or in eastern males, this variation is presumed geographic and not specific. We have been unable to detect the differences (a proportionately wider epigynum and more transverse lateral margins) by which Chamberlin distinguished the holotype of *yavapainus* from other western specimens.

Drassodes saccatus (Emerton)
new combination
Figures 2, 37-48; Map 4

Drassus saccatus Emerton, 1890, p. 178, pl. 4, fig. 7 (male and female syntypes from Melrose, Middlesex County, Massachusetts, in MCZ, examined).

Drassus neglectus (incorrect synonymy): Banks, 1893, p. 125.

Drassodes centralis F. O. P.-Cambridge, 1899, p. 60, pl. 4, fig. 13 (female holotype from Puebla, Puebla, Mexico, in BMNH, examined). Roewer, 1954, p. 396. Bonnet, 1956, p. 1562. NEW SYNONYMY.

Drassodes neglectus (misidentification): Comstock, 1903, p. 18 (in part). Roewer, 1954, p. 397 (in part). Bonnet, 1956, p. 1582 (in part).

Drassodes celes Chamberlin, 1919a, p. 5, pl. 2, fig. 2 (female holotype from Claremont, Los Angeles County, California, in MCZ, examined). Roewer, 1954, p. 397. Bonnet, 1956, p. 1562. NEW SYNONYMY.

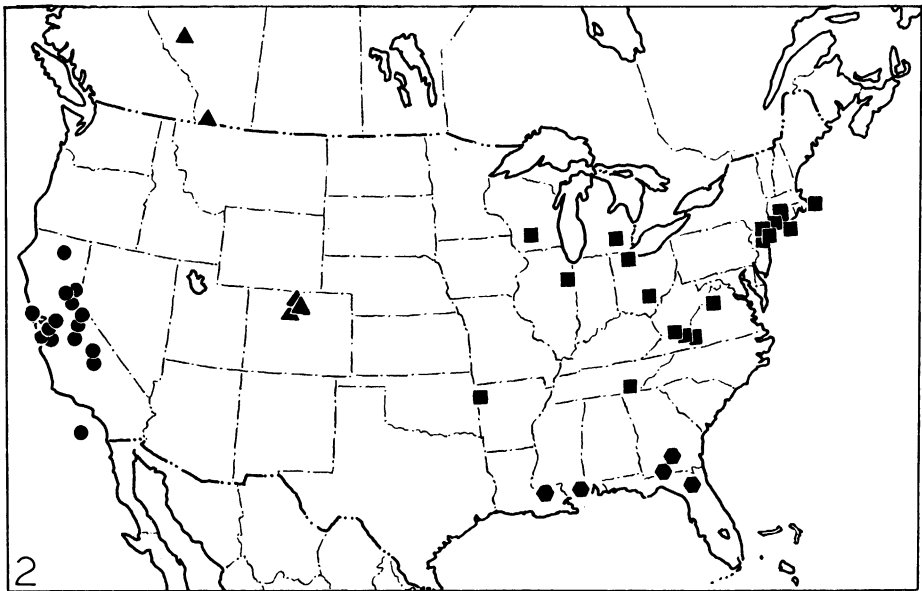
Drassodes robinsoni Chamberlin, 1919b, p. 245, pl. 16, fig. 2 (female holotype from Fillmore, Millard County, Utah, in MCZ, examined). Roewer, 1954, p. 398. Bonnet, 1956, p. 1587. NEW SYNONYMY.

Diagnosis. Males of *Drassodes saccatus* may be distinguished by the combination of the following characters: six or more dorsodistal spines on the palpal femur, embolus not separated from the prolateral side of the tegulum by a distinct unsclerotized gap, and the median apophysis and embolus situated relatively near each other (figs.

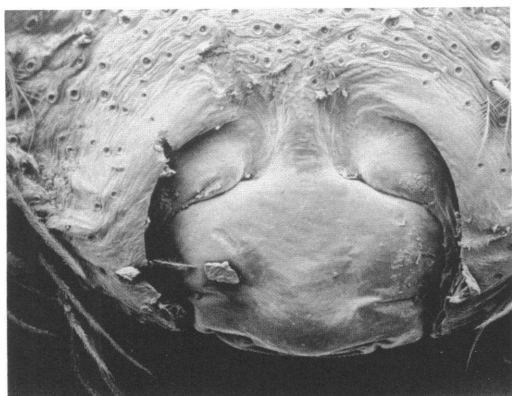
37, 41); females may be distinguished by the large epigynal midpiece situated far from the only moderately large lateral margins (figs. 39, 43, 45-48).

Male. Total length 8.78 ± 1.31 mm. Carapace 3.95 ± 0.63 mm. long, 2.77 ± 0.51 mm. wide. Femur II 3.20 ± 0.41 mm. long (221 specimens examined). Chelicerae with two retromarginal denticles. Palpal femur with six to 11 dorsodistal spines. Eye sizes and interdistances (mm.): AME 0.13, ALE 0.13, PME 0.15, PLE 0.12; AME-AME 0.15, AME-ALE 0.06, PME-PME 0.09, PME-PLE 0.26, ALE-PLE 0.16. MOQ length 0.45 mm., front width 0.41 mm., back width 0.38 mm. Embolus near median apophysis (figs. 37, 41). Retrolateral tibial apophysis narrow (figs. 38, 42). Leg spination: tibiae: III r1-1-1; IV p0-1-1; metatarsus III r2-1-2.

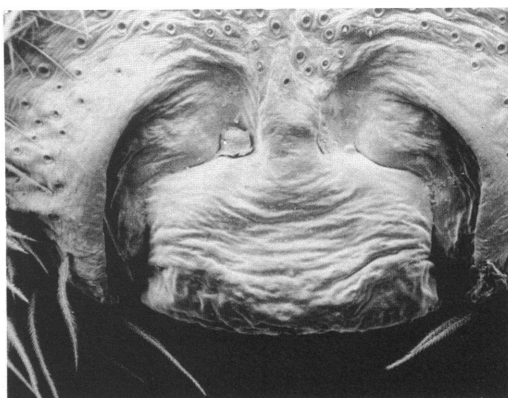
Female. Total length 9.14 ± 0.92 mm. Carapace 4.12 ± 0.43 mm. long, 2.85 ± 0.26 mm. wide. Femur II 2.97 ± 0.28 mm. long (241 specimens examined). Chelicerae with two retromarginal denticles. Palpal femur with two to six (usually six) dorsodistal spines. Eye sizes and interdistances (mm.): AME 0.13, ALE 0.15, PME 0.18, PLE 0.13; AME-AME 0.18, AME-ALE



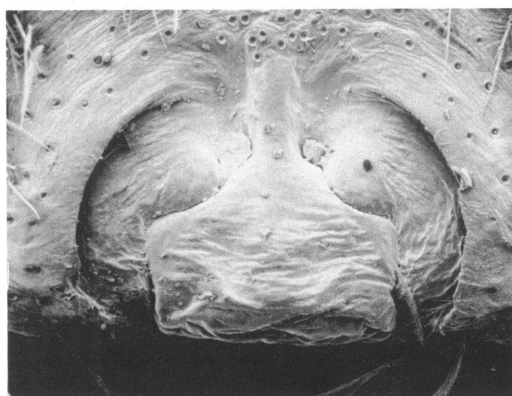
MAP 2. North America, showing distribution of *Drassodes mirus* (triangles), *D. auriculoides* (squares), *D. louisianus* (hexagons), and *D. angulus* (circles).



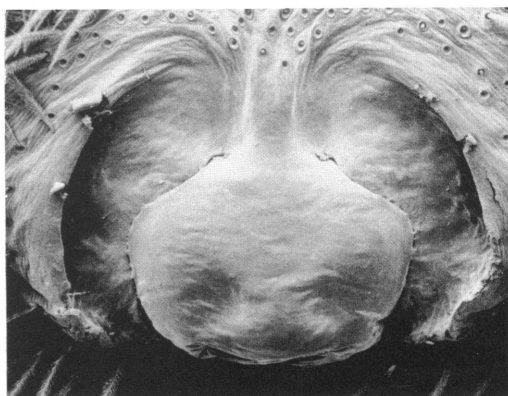
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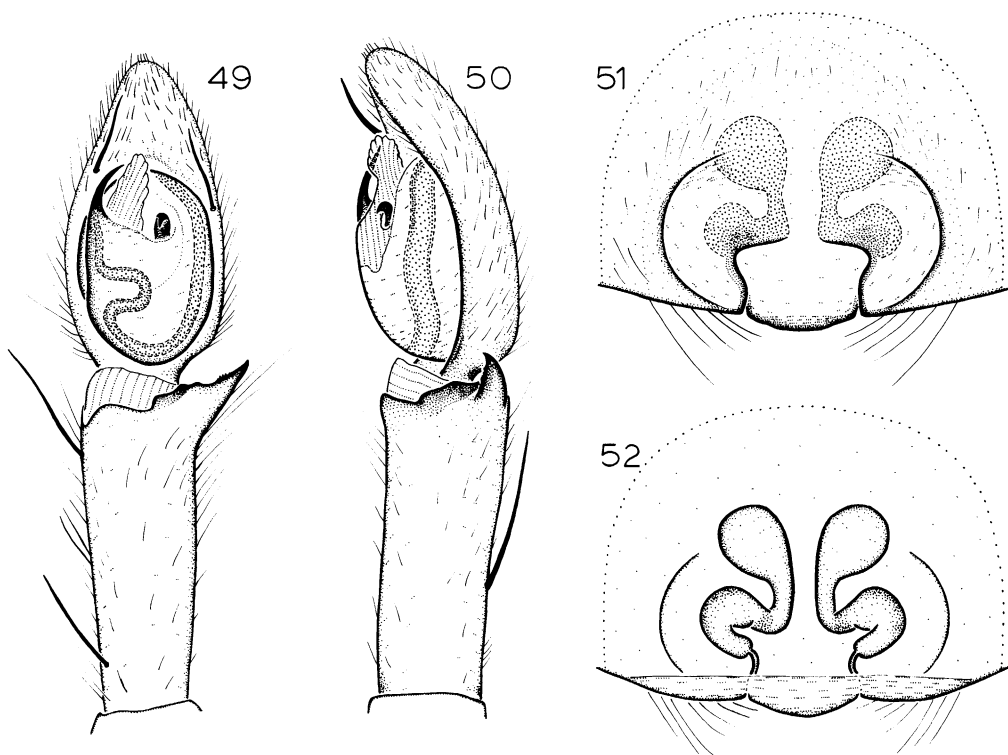
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FIGS. 45-48. *Drassodes saccatus* (Emerton), epigyna, ventral views, 125 \times , variants from four specimens collected together in Chihuahua, Mexico.

0.09, PME-PME 0.11, PME-PLE 0.36, ALE-PLE 0.26. MOQ length 0.54 mm., front width 0.44 mm., back width 0.47 mm. Epigynal midpiece relatively large, well separated from lateral margins (figs. 39, 43, 45-48). Spermathecae angular (figs. 40, 44). Leg spination: femur IV p0-0-1, r0-0-1.

Records. **Canada:** *Alberta:* Etzikom; Fort McLeon; South Saskatchewan River. *British Columbia:* Fountain Station; Summerland. *Saskatchewan:* Estevan; Robsart. **United States** (county records): *Arizona:* Apache, Cochise, Coconino, Navajo, Pima, Santa Cruz, Yavapai. *California:* Contra Costa, El Dorado, Fresno, Los Angeles, Mono, Placer, Plumas, San Bernardino, San Diego, Sierra, Siskiyou, Sonoma, Stanislaus,

Tuolumne. *Colorado:* Archuleta, Chaffee, Costillo, El Paso, Fremont, Gunnison, Montrose, Pueblo, Saguache, San Miguel. *Connecticut:* New Haven. *Idaho:* Ada, Bear Lake, Butte. *Illinois:* Lake. *Kansas:* Chase, Riley. *Massachusetts:* Barnstable, Dukes, Essex, Middlesex. *Michigan:* Iosco. *Minnesota:* Hennepin. *Missouri:* Phelps. *Nevada:* Clark, Washoe. *New Hampshire:* Cheshire. *New Mexico:* Bernalillo, Grant, Hidalgo, Lincoln, McKinley, Union, Valencia. *Oregon:* Baker, Deschutes, Grant, Harney, Jackson, Klamath, Lake, Malheur. *Texas:* Brewster, Jeff Davis. *Utah:* Box Elder, Carbon, Emery, Garfield, Grand, Millard, Salt Lake, San Juan, Sevier, Washington. *Washington:* Chelan, Grant, Kittitas. *Wyoming:* Albany, Big Horn, Carbon, Fremont,



FIGS. 49-52. *Drassodes auriculoides* Barrows. 49. Palp, ventral view. 50. Palp, retrolateral view. 51. Epigynum, ventral view. 52. Vulva, dorsal view.

Goshen, Sweetwater, Uinta. **Mexico:** *Baja California Norte*: San José; San Telmo. *Chihuahua*: Cañón Prieta; Catarinas; Chihuahua; Cuevas; Gran Morelos; La Saucedá; Las Canoas; Matáchic; Primavera; San Francisco Mesa; San José Bavi-cora; Santa Bárbara. *Durango*: Palos Colorados. *Jalisco*: Guadalajara; Tlaquepaque. *Oaxaca*: Mitla; Monte Alban; Nochixtlan; Oaxaca. *Puebla*: Atlixco; Puebla; Tlacotepec. *Zacatecas*: Canu-tillo; Villa Insurgentes; Zacatecas.

Distribution. British Columbia to Massachusetts, south to Baja California Norte, Oaxaca, and Missouri (map 4).

Natural History. Mature males have been taken from mid-May through mid-September, mature females from late May through November. Specimens have been collected at elevations up to 10,000 feet, in pitfall traps in grassland; under rocks, bark, and dry cow manure; in houses; by Malaise traps; and associated with

pinyon and yellow pine, juniper, yucca, allthorn, mesquite, ephedra, nolina, sagebrush, and reeds.

Synonymy. The genitalia of the female types of *centralis*, *celes*, and *robinsoni* all fall within the range of variation shown by females collected at a single place and time (figs. 45-48). The range of variation is similar throughout the distribution of the species as indicated above, and we found no consistent correlations between any of these variants and their geographical or temporal distribution.

Drassodes auriculoides Barrows

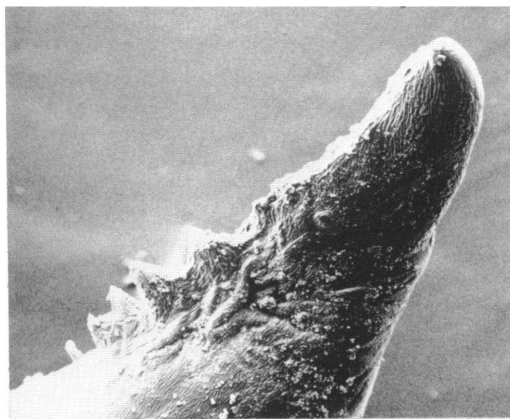
Figures 49-56; Map 2

Drassodes auriculoides Barrows, 1919, p. 355, pl. 15, fig. 4 (female holotype from Rockbridge, Hocking County, Ohio, in OSU, examined). Roewer, 1954, p. 397.

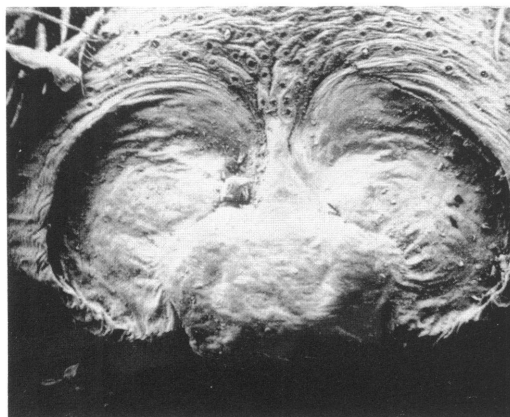
Geodrassus auriculoides: Chamberlin, 1922, p. 160. Bonnet, 1957, p. 1987.



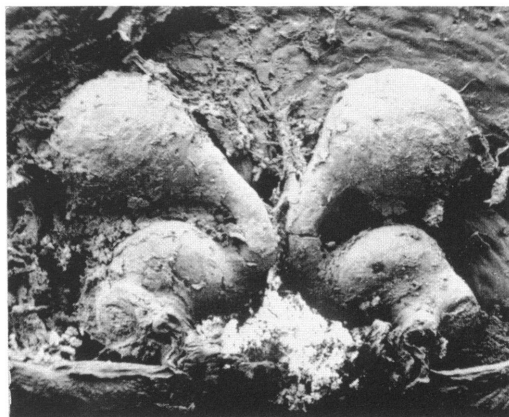
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FIGS. 53-56. *Drassodes auriculoides* Barrows. 53. Embolar region of palp, ventral view, 260 \times . 54. Retrolateral tibial apophysis, ventral view, 650 \times . 55. Epigynum, ventral view, 130 \times . 56. Vulva, dorsal view, 130 \times .

Drassodes robinsoni (misidentification): Kaston, 1938, p. 178, figs. 12-14.

Diagnosis. Males of *Drassodes auriculoides* may be distinguished by the combination of the following characters: five or six dorsodistal spines on the palpal femur, embolus not separated from the prolateral side of the tegulum by a distinct unsclerotized gap, and the median apophysis and embolus situated relatively far apart (figs. 49, 53); females can be easily recognized by the large circles formed by the lateral margins of the epigynum (figs. 51, 55).

Male. Total length 8.32 \pm 1.09 mm. Carapace 3.63 \pm 0.45 mm. long, 2.61 \pm 0.35 mm. wide. Femur II 3.37 \pm 0.39 mm. long (10 specimens). Chelicerae with two retromarginal denticles. Palpal femur with five or six dorsodistal spines. Eye sizes and interdistances (mm.): AME 0.12, ALE 0.13, PME 0.17, PLE 0.12; AME-AME 0.17, AME-ALE 0.06, PME-PME 0.09, PME-PLE 0.23, ALE-PLE 0.12. MOQ length 0.38 mm., front width 0.41 mm., back width 0.43 mm. Embolus far from median apophysis (figs. 49, 53). Retrolateral tibial apophysis wide (figs. 50, 54). Leg spination: tibia IV v2-2-2.

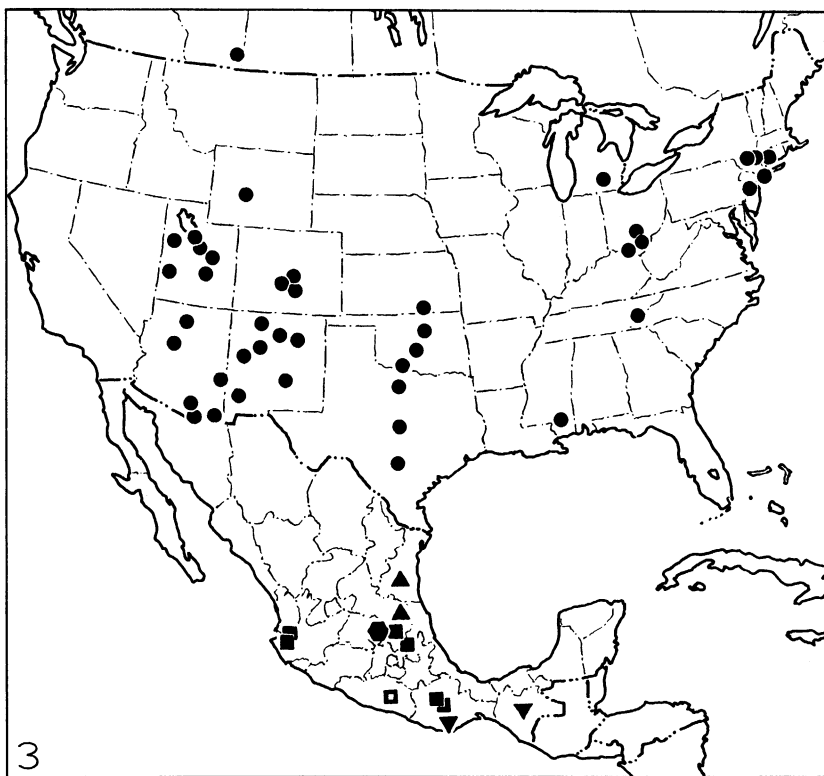
Female. Total length 9.09 ± 1.30 mm. Carapace 4.07 ± 0.42 mm. long, 2.99 ± 0.31 mm. wide. Femur II 3.23 ± 0.27 mm. long (35 specimens examined). Chelicerae with two retromarginal denticles. Palpal femur with three to seven dorso-distal spines. Eye sizes and interdistances (mm.): AME 0.16, ALE 0.15, PME 0.18, PLE 0.13; AME-AME 0.20, AME-ALE 0.15, PME-PME 0.12, PME-PLE 0.41, ALE-PLE 0.26. MOQ length 0.59 mm., front width 0.51 mm., back width 0.48 mm. Lateral margins of epigynum forming large circles (figs. 51, 55). Spermathecae narrow (figs. 52, 56). Leg spination typical for the genus.

Records. **United States:** *Arkansas:* Washington Co.: Cove Creek; Fayetteville. *Connecticut:* Fairfield Co.: New Canaan; Norwalk. *Hartford Co.:*

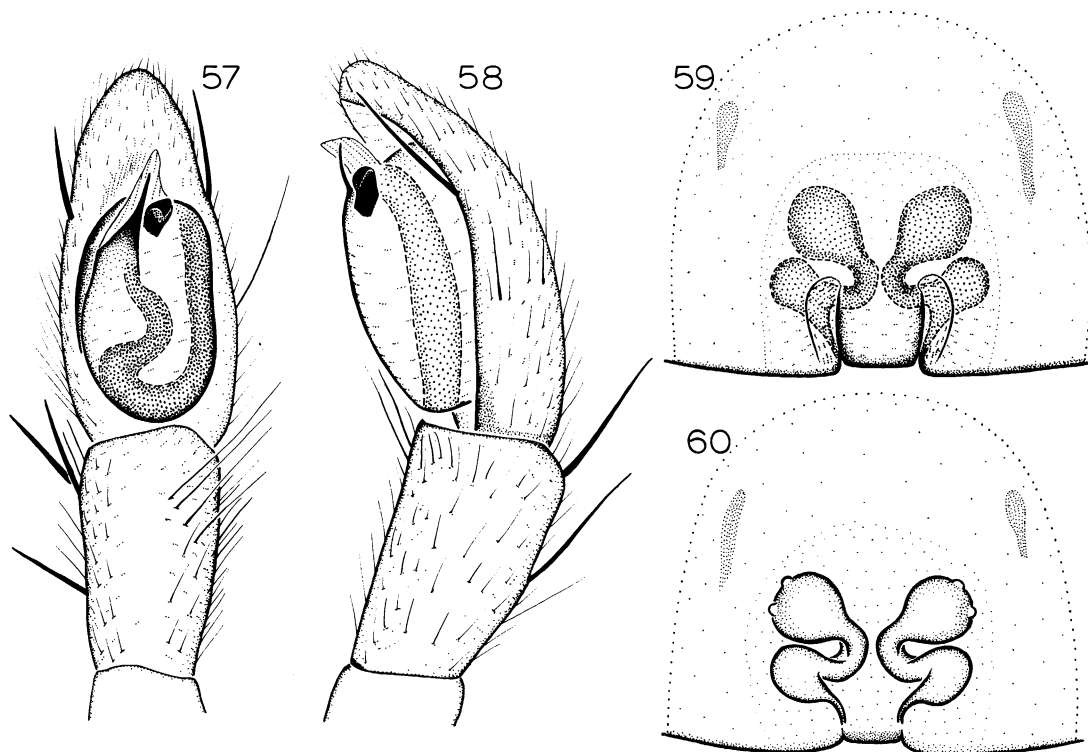
New Britain. New Haven Co.: Branford; Cheshire; Woodbridge. *Illinois:* Kankakee Co.: Pembroke. *Massachusetts:* Barnstable Co.: Woods Hole. *Michigan:* Livingston Co.: E. S. George Reserve. *New Jersey:* Essex Co.: Millburn. *New York:* Bronx Co. Orange Co.: Greenwood Lake. Suffolk Co.: Smithtown, Long Island. *Ohio:* Hocking Co.: Rockbridge. Lucas Co. *Tennessee:* Hamilton Co.: Lookout Mountain. *Virginia:* Giles Co. Montgomery Co.: Blacksburg. Page Co.: E Luray. *West Virginia:* Mercer Co.: 2 mi. S Athens. *Wisconsin:* Sauk Co.: Baraboo.

Distribution. Wisconsin to Massachusetts, south to Arkansas and Tennessee (map 2).

Natural History. Mature males have been taken from late May through late June, mature females from late May through mid-October.



MAP 3. North America, showing distribution of *Drassodes gosiutus* (circles), *Tivodrassus ethophor* (squares; open symbol indicates locality of unavailable type specimen), *T. pecki* (inverted triangles), *T. reddelli* (hexagon), and *T. farias* (upright triangles).



FIGS. 57-60. *Drassodes louisianus* Roddy. 57. Palp, ventral view. 58. Palp, retrolateral view. 59. Epigynum, ventral view. 60. Vulva, dorsal view.

Specimens have been collected under a board in a high dry pasture and in a pitfall trap in leaf litter.

Drassodes louisianus Roddy
Figures 57-60; Map 2

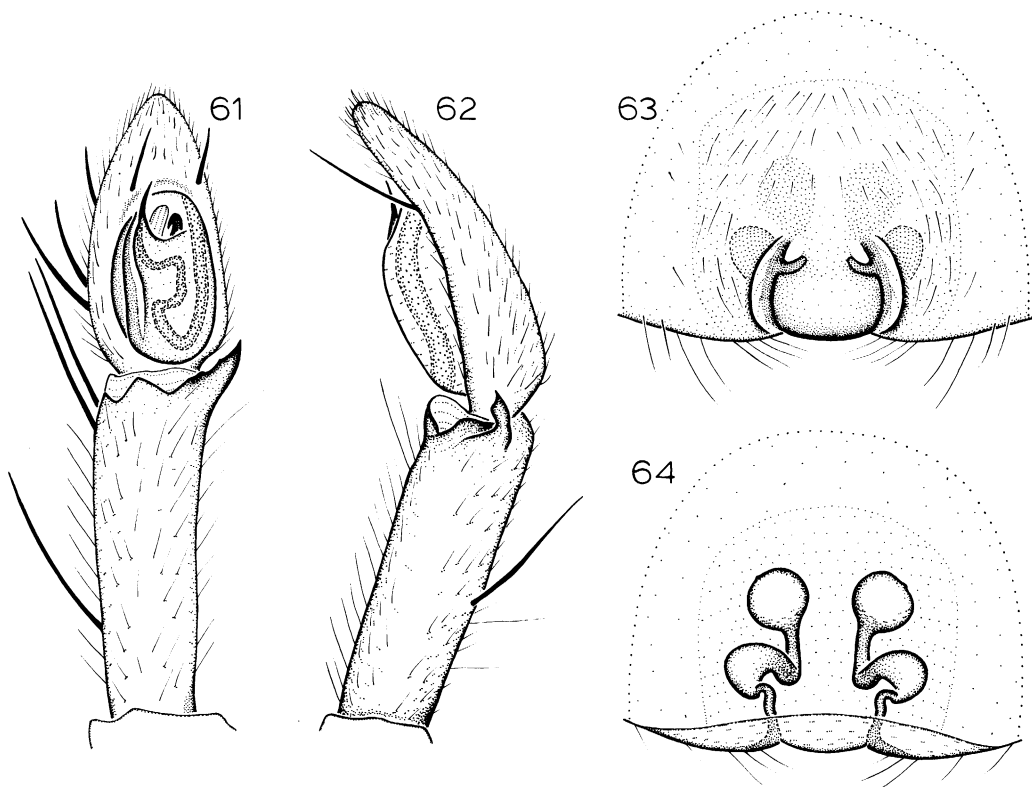
Drassodes louisianus Roddy, 1957, p. 290, fig. 2 (female holotype from Baton Rouge, East Baton Rouge Parish, Louisiana, in AMNH, examined).

Diagnosis. *Drassodes louisianus* is a distinctive species easily recognized by the medially situated embolus (fig. 57) and short epigynal midpiece (fig. 59).

Male. Total length 3.82-4.00 mm. Carapace 1.76-1.94 mm. long, 1.26-1.44 mm. wide. Femur II 1.33-1.51 mm. long (three specimens). Chelicerae with two retromarginal denticles. Palpal femur with four dorsodistal spines. Eye sizes and interdistances (mm.): AME 0.06, ALE 0.07, PME

0.10, PLE 0.09; AME-AME 0.08, AME-ALE 0.02, PME-PME 0.03, PME-PLE 0.07, ALE-PLE 0.03. MOQ length 0.24 mm., front width 0.21 mm., back width 0.23 mm. Embolus situated medially (fig. 57). Retrolateral tibial apophysis reduced to tiny anterior cusp (fig. 58). Leg spination: femora: I d1-1-1, p0-1-1; II d1-1-1; tibiae: I v2-2-0; II v1p-2-0; III v1p-2-2; IV v2-2-2; metatarsi: I v2-0-0; II v2-1p-0; III p0-2-2, r0-1-2; IV r1-2-2.

Female. Total length 6.37-9.11 mm. Carapace 2.91-3.58 mm. long, 2.15-2.34 mm. wide. Femur II 2.02-2.27 mm. long (four specimens). Chelicerae with two to six retromarginal denticles. Palpal femur with four dorsodistal spines. Eye sizes and interdistances (mm.): AME 0.11, ALE 0.12, PME 0.11, PLE 0.11; AME-AME 0.11, AME-ALE 0.05, PME-PME 0.08, PME-PLE 0.16, ALE-PLE 0.09. MOQ length 0.34 mm., front width 0.32 mm., back width 0.30 mm. Epigynal



FIGS. 61-64. *Drassodes angulus*, new species. 61. Palp, ventral view. 62. Palp, retrolateral view. 63. Epigynum, ventral view. 64. Vulva, dorsal view.

midpiece short, near lateral margins (fig. 59). Spermathecae sinuous (fig. 60). Leg spination: tibiae: I v1p-1p-0; II v0-2-0; III v1p-2-2; metatarsi: I v0-0-0; III p0-2-2, v1p-2-2, r0-2-2; IV r0-2-2.

Material Examined. **United States:** **Florida:** Alachua Co.: Gainesville, May 24, 1950, in building (H. K. Wallace, HKW), 1♀; Mar. 22, 1963, in drawer, fed on *Filistata hibernalis* (K. J. Stone, FSCA), 1♀; 1006 West Union Street, May 11, 1948 (H. K. Wallace, AMNH), 1♂. **Georgia:** Thomas Co.: Bar M Ranch, Mar. 3, 1974 (W. Sedgwick, WS), 1♀. Tift Co.: Tifton, June 3, 1968, on floor in home (J. A. Payne, EPC), 1♂. **Louisiana:** East Baton Rouge Par.: Baton Rouge, July 14, 1955, wooded area near campus (L. Roddy, AMNH), 1♀ (holotype). **Mississippi:** Jackson Co.: Gulf Hills, Ocean Springs, June 20-30, 1961, in cottage (N. Causey, MCZ), 1♂.

Distribution. Louisiana east to Florida (map 2).

Drassodes angulus, new species

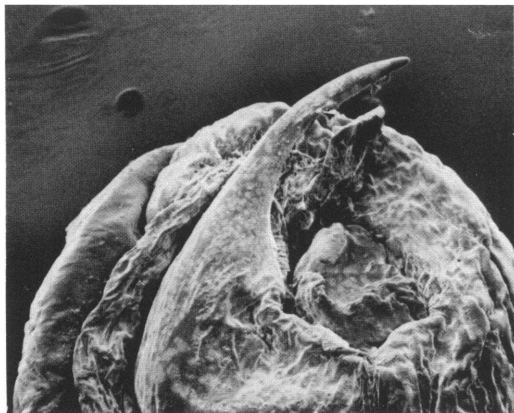
Figures 61-68; Map 2

Types. Male holotype and female paratype from 4 miles west of Pinecrest, Tuolumne County, California (July 12, 1961; J. G. Rozen, Jr.), deposited in AMNH.

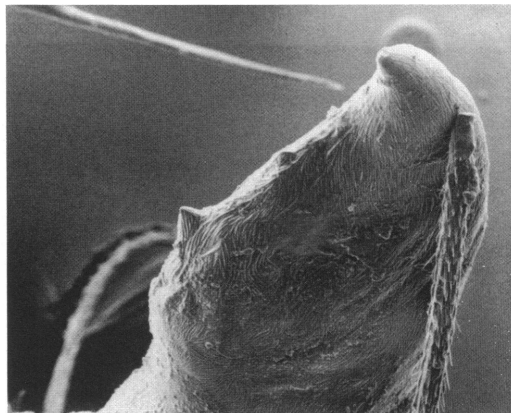
Etymology. The specific name is from the Latin *angulus* (angle), referring to the angle of the palpal duct just below the embolus origin.

Diagnosis. *Drassodes angulus* is a distinctive species easily recognized by the presence of a distinct unsclerotized gap between the embolus and prolateral side of the tegulum as well as the sharp angle of the palpal duct just below the embolus origin (figs. 61, 65) and the large, anteriorly invaginated epigynal midpiece (figs. 63, 67).

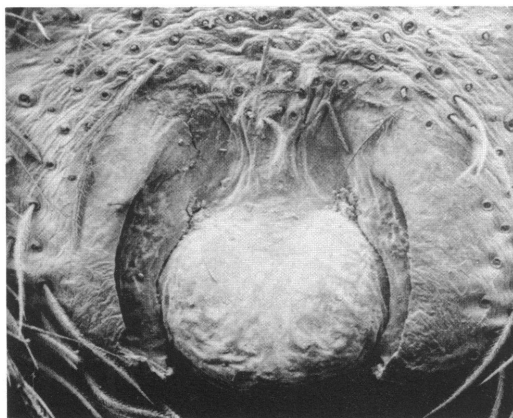
Male. Total length 9.42 ± 1.30 mm. Carapace 4.20 ± 0.72 mm. long, 3.04 ± 0.66 mm. wide.



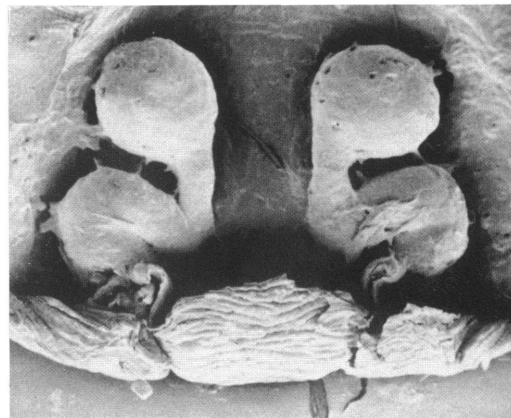
65



66



67



68

FIGS. 65-68. *Drassodes angulus*, new species. 65. Embolar region of palp, ventral view, 260 \times . 66. Retrolateral tibial apophysis, ventral view, 650 \times . 67. Epigynum, ventral view, 125 \times . 68. Vulva, dorsal view, 125 \times .

Femur II 3.45 \pm 0.64 mm. long (24 specimens examined). Chelicerae with two retromarginal denticles. Palpal femur with eight to 13 dorso-distal spines. Eye sizes and interdistances (mm.): AME 0.13, ALE 0.13, PME 0.15, PLE 0.13; AME-AME 0.16, AME-ALE 0.10, PME-PME 0.11, PME-PLE 0.30, ALE-PLE 0.20. MOQ length 0.46 mm., front width 0.41 mm., back width 0.41 mm. Embolus bordered prolaterally with unsclerotized strip; palpal duct coiled immediately below embolus (figs. 61, 65). Retrolateral tibial apophysis bent (figs. 62, 66). Leg spination: tibiae: III v1p-2-2, r1-1-1; IV v2-2-2; metatarsus III r1-2-2.

Female. Total length 8.92 \pm 1.07 mm. Carapace 3.95 \pm 0.45 mm. long, 2.87 \pm 0.38 mm. wide. Femur II 2.97 \pm 0.31 mm. long (24 specimens examined). Chelicerae with two retromarginal denticles. Palpal femur with three to seven dorso-distal spines. Eye sizes and interdistances (mm.): AME 0.09, ALE 0.13, PME 0.15, PLE 0.13; AME-AME 0.21, AME-ALE 0.09, PME-PME 0.12, PME-PLE 0.32, ALE-PLE 0.22. MOQ length 0.49 mm., front width 0.39 mm., back width 0.42 mm. Epigynal midpiece invaginated anteriorly (figs. 63, 67). Basal and distal lobes of spermathecae widely separated (figs. 64, 68). Leg spination: tibia III r1-1-1; metatarsus III r2-2-2.

Records. United States: California: Alpine Co.: Clark Fork Road. Contra Costa Co.: Clayton; Castlerock Park, 5 mi. W Mt. Diablo. Fresno Co.: Huntington Lake; Indian Valley; Shaver Lake. Los Angeles Co.: West Cove, San Clemente Island. Marin Co.: Mill Valley. Mariposa Co.: Coulterville; Aspen Valley, Yosemite National Park. Nevada Co.: Donner Pass. Placer Co.: Tahoe City. San Mateo Co.: 0.5 mi. W San Bruno. Santa Clara Co.: mountains SE Livermore. Sierra Co.: Peavine. Siskiyou Co.: McCloud. Solano Co.: Fairfield. Tulare Co.: 3 mi. W Giant Forest and near main camp, Sequoia National Park. Tuolumne Co.: 4 mi. W Pinecrest. Yuba Co.: Strawberry.

Distribution. California (map 2).

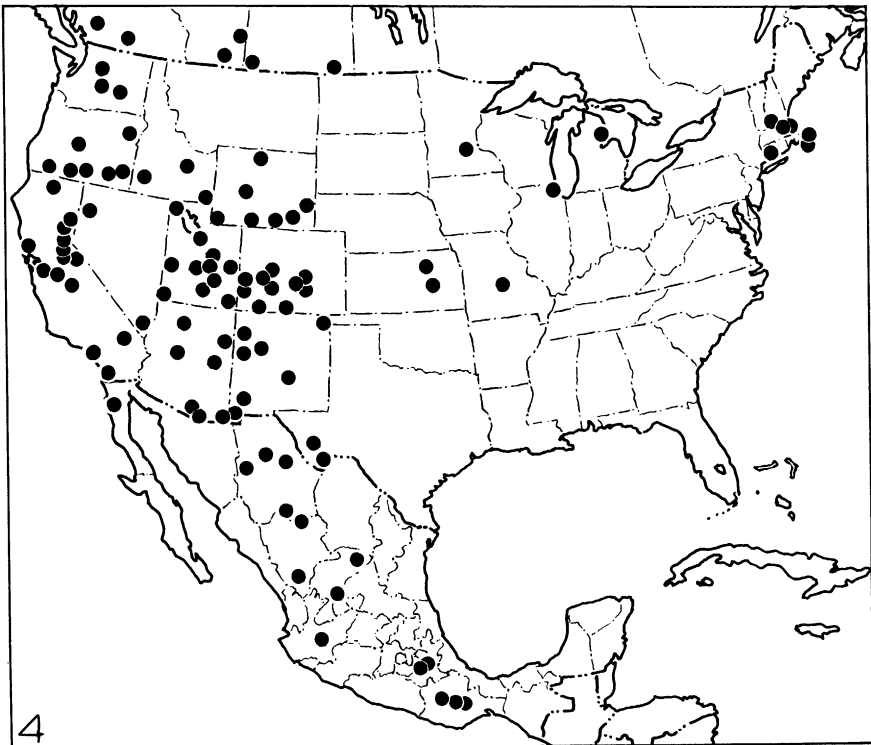
Natural History. Mature males have been taken from late March through mid-July, mature females from late April through early September. Specimens have been collected at elevations up to 5500 feet, by sweeping near a stream, and under *Astragalus miguelensis* (Leguminosae).

TIVODRASSUS CHAMBERLIN AND IVIE

Tivodrassus Chamberlin and Ivie, 1936, p. 12 (type species by original designation *T. ethophor* Chamberlin and Ivie). Roewer, 1954, p. 408. Bonnet, 1959, p. 4636.

Diagnosis. *Tivodrassus* may be easily recognized by the reduced size of the anterior median eyes; their diameter is always less than half the anterior lateral eye diameter. The epigynum is characteristically reduced to a flattened posterior plate (figs. 71, 75, 77, 79) and there are three retrolateral tibial apophyses (figs. 70, 74).

Description. Total length 2.5-4.5 mm. Carapace oval in dorsal view, widest between coxae II and III, greatly narrowed in front, pale brown, with erect black setae. Cephalic area elevated along midline; thoracic groove longitudinal. From front, anterior eye row slightly recurved to slightly procurved, posterior row procurved. PME irregularly triangular, ALE and PLE oval, AME circular. AME reduced, less than half the ALE



MAP 4. North America, showing distribution of *Drassodes saccatus*.

diameter. AME separated by their diameter or more, by roughly their diameter from ALE. Posterior eyes usually separated by slightly less than their diameter. Lateral eyes separated by their radius. MOQ wider in back than in front, and than long. Clypeal height more than twice the AME diameter. Chelicerae with three promarginal teeth and two retromarginal denticles. Endites acuminate. Labium almost square. Sternum rounded, with posterior extension between hind coxae. Leg formula 4123. Tarsi with two dentate claws and claw tufts. Metatarsal preening comb reduced to series of fine, light setae. Trochanters unnotched. Tarsi lightly scopulate. Typical leg spination pattern (only surfaces bearing spines listed): femora I-IV d1-0-0; tibiae: I v2-4-0; II v1r-2r-0; III p0-1-1, v2-2-2, r0-1-1; IV d0-1-0, p1-1-1, v2-2-2, r1-1-1; metatarsi: I, II v2-2-0; III, IV p0-1-0, v2-2-0. Abdomen brownish gray, sometimes with vague chevron pattern posteriorly; males with dorsal scutum at front. Six spinnerets, anteriors widely separated, with six spigots. Palp with three retrolateral tibial apophyses, prolaterally situated embolus, transparent conductor, and elongate median apophysis; cymbium with pronounced lobe at base on retrolateral side (figs. 69, 70). Epigynum with flat posterior plate (fig. 71). Spermathecae highly coiled, with median and lateral ducts (fig. 72).

KEY TO SPECIES OF *TIVODRASSUS*

1. Males 2
Females 3
2. Middle retrolateral tibial apophysis relatively short (fig. 74); embolus relatively long (fig. 73). *pecki*
Middle retrolateral tibial apophysis relatively long (fig. 70); embolus relatively short (fig. 69). *ethophor*
3. Epigynum with externally visible long median ducts (fig. 79). *farias*
Epigynum without externally visible long median ducts 4
4. Median ducts of epigynum approximate posteriorly (figs. 72, 76). 5
Median ducts of epigynum widely separated posteriorly (fig. 78). *reddelli*
5. Median ducts of epigynum branched; lateral ducts relatively short (fig. 72) . . *ethophor*

Median ducts of epigynum unbranched; lateral ducts relatively long (fig. 76). *pecki*

Tivodrassus ethophor Chamberlin and Ivie Figures 69-72; Map 3

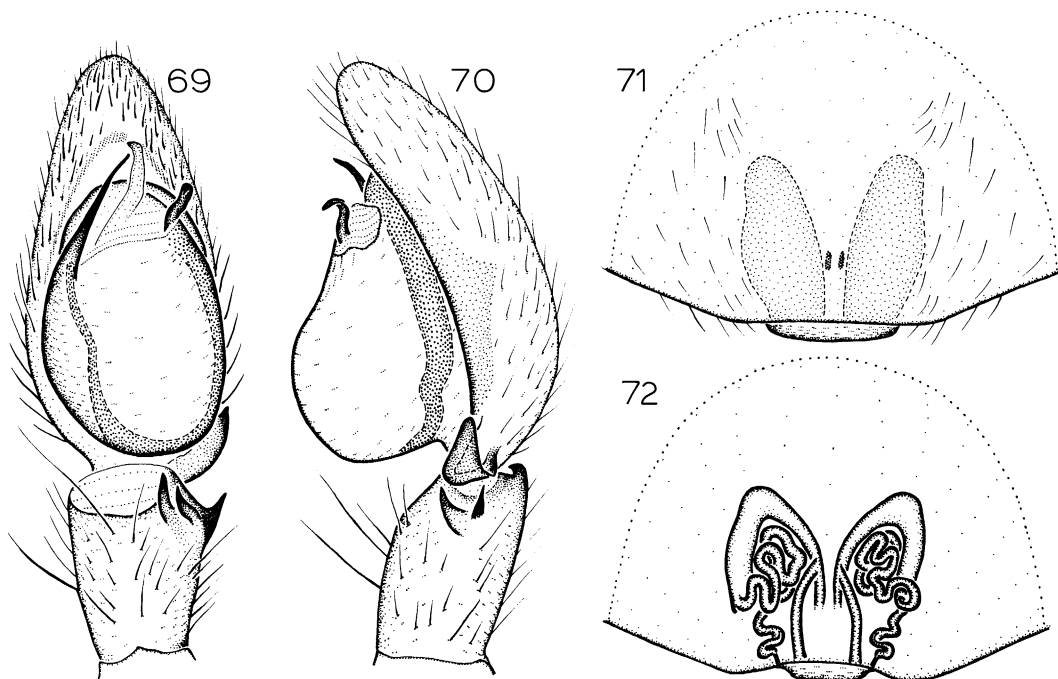
Tivodrassus ethophor Chamberlin and Ivie, 1936, p. 13, figs. 17-21 (female holotype from Chilapa, Guerrero, Mexico, in University of Utah, lost). Roewer, 1954, p. 408. Bonnet, 1959, p. 4636.

Diagnosis. Males of *Tivodrassus ethophor* may be distinguished by their long middle retrolateral tibial apophysis (figs. 69, 70), females by their short lateral epigynal ducts (fig. 72).

Male. Total length 3.49-4.07 mm. Carapace 1.33-1.78 mm. long, 1.12-1.48 mm. wide. Femur II 1.22-1.62 mm. long (four specimens). Eye sizes and interdistances (mm.): AME 0.04, ALE 0.10, PME 0.09, PLE 0.09; AME-AME 0.04, AME-ALE 0.01, PME-PME 0.06, PME-PLE 0.06, ALE-PLE 0.02. MOQ length 0.17 mm., front width 0.11 mm., back width 0.24 mm. Middle retrolateral tibial apophysis elongate; embolus relatively short, straight (figs. 69, 70). Leg spination: tibia IV d1-1-1; metatarsi: III v0-2-0; IV v1p-1p-1p.

Female. Total length 2.99-3.85 mm. Carapace 1.19-1.46 mm. long, 0.94-1.24 mm. wide. Femur II 0.76-1.19 mm. long (four specimens). Eye sizes and interdistances (mm.): AME 0.04, ALE 0.10, PME 0.09, PLE 0.09; AME-AME 0.04, AME-ALE 0.01, PME-PME 0.05, PME-PLE 0.06, ALE-PLE 0.04. MOQ length 0.18 mm., front width 0.12 mm., back width 0.23 mm. Median epigynal ducts branched, lateral ducts short (figs. 71, 72). Leg spination: tibiae: III v1p-2-2, r0-1-0; IV d0-2-0; metatarsi: III v2-2-0; IV p0-1-1, v1p-2-2.

Material Examined. **Mexico:** *Hidalgo:* 5 mi. N Encarnación, July 28, 1966, elevation 6000 feet (J. and W. Ivie, AMNH), 1♀; 6.4 mi. S Tenango de Doria, July 24-28, 1969, carrion trap in pine-oak forest, elevation ca. 9800 feet (S. and J. Peck, AMNH), 1♂. *Jalisco:* near El Rincón, 33.7 mi. NW Los Volcanes, Aug. 11, 1967, elevation 5400 feet (R. E. Leech, REL), 1♀; 10.8 mi. S Talpa de Allende, Aug. 8, 1967, elevation 4900 feet (R. E. Leech, REL), 1♀. *Oaxaca:* Highway 190, 33 mi. NW Oaxaca, Sept. 4, 1967, elevation



FIGS. 69-72. *Tivodrassus ethophor* Chamberlin and Ivie. 69. Palp, ventral view. 70. Palp, retrolateral view. 71. Epigynum, ventral view. 72. Vulva, dorsal view.

7500 feet (R. E. Leech, REL), 1♂; 20 km. N Oaxaca, June 7, 1971, Berlese sample of oak litter, elevation 9500 feet (S. B. Peck, MCZ), 2♂, 1♀.

Distribution. Jalisco to Hidalgo, south to northern Oaxaca, Mexico (map 3).

***Tivodrassus pecki*, new species**

Figures 73-76; Map 3

Types. Male holotype from carrion trap in pine-oak forest, elevation 8000 feet, 5 km. west of San Cristóbal de las Casas, Chiapas, Mexico (August 16-September 3, 1969; S. and J. Peck) and female paratype from pine-oak forest, San Cristóbal de las Casas (July 12, 1950; C. J. Goodnight and L. J. Stannard), deposited in AMNH.

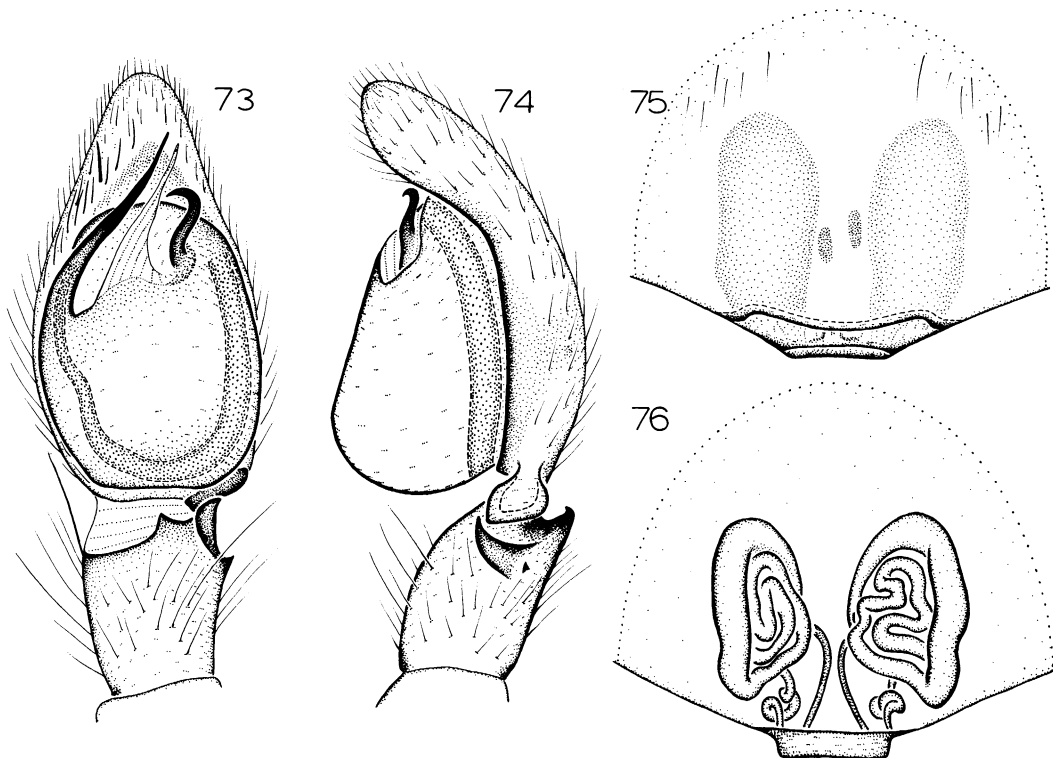
Etymology. The specific name is a patronym in honor of Dr. Stewart B. Peck of Carleton University, who has collected half of the known *Tivodrassus* specimens.

Diagnosis. Males of *Tivodrassus pecki* may be

distinguished by their short middle retrolateral tibial apophysis (figs. 73, 74), females by their long lateral epigynal ducts (fig. 76).

Male. Total length 2.59-3.56 mm. Carapace 1.15-1.73 mm. long, 0.97-1.40 mm. wide. Femur II 0.94-1.51 mm. long (four specimens). Eye sizes and interdistances (mm.): AME 0.03, ALE 0.08, PME 0.09, PLE 0.07; AME-AME 0.04, AME-ALE 0.03, PME-PME 0.07, PME-PLE 0.05, ALE-PLE 0.03. MOQ length 0.17 mm., front width 0.10 mm., back width 0.25 mm. Middle retrolateral tibial apophysis short; embolus relatively long, bent (figs. 73, 74). Leg spination: metatarsi: II v1r-2-0; IV p1-1-1, r1-1-0.

Female. Total length 3.35 mm. Carapace 1.37 mm. long, 1.10 mm. wide. Femur II 0.90 mm. long (paratype). Eye sizes and interdistances (mm.): AME 0.04, ALE 0.09, PME 0.08, PLE 0.08; AME-AME 0.06, AME-ALE 0.02, PME-PME 0.06, PME-PLE 0.05, ALE-PLE 0.04. MOQ length 0.16 mm., front width 0.13 mm., back width 0.22 mm. Median epigynal ducts unbranched, lateral ducts long (figs. 75, 76). Leg



FIGS. 73-76. *Tivodrassus pecki*, new species. 73. Palp, ventral view. 74. Palp, retrolateral view. 75. Epigynum, ventral view. 76. Vulva, dorsal view.

spination: tibiae: III v1r-2-1r; IV d1-1-0, p1-1-2; metatarsi: II v1r-2-0; IV p1-1-0, r1-1-0.

Material Examined. Mexico: *Chiapas*: 5 km. W San Cristóbal de las Casas, Aug. 12-16, 1969, human dung trap in pine-oak forest, elevation 8000 feet (S. and J. Peck, AMNH), 1♂; Aug. 16-Sept. 3, 1969, carrion trap in pine-oak forest, elevation 8000 feet (S. and J. Peck, AMNH), 1♂. *Oaxaca*: 3.5 mi. S Suchixtepec, June 3, 1971, Berlese sample of leaf litter (S. B. Peck, MCZ), 1♂.

Distribution. Southern Oaxaca and Chiapas, Mexico (map 3).

***Tivodrassus reddelli*, new species**

Figures 77, 78; Map 3

Type. Female holotype from Nacimiento, Río Blanco, Querétaro, Mexico (July 8, 1967; J. Reddell, J. Fish, and P. Russell), deposited in AMNH.

Etymology. The specific name is a patronym

in honor of Mr. James Reddell of Texas Tech University, in recognition of his indefatigable collecting of Mexican Arachnida.

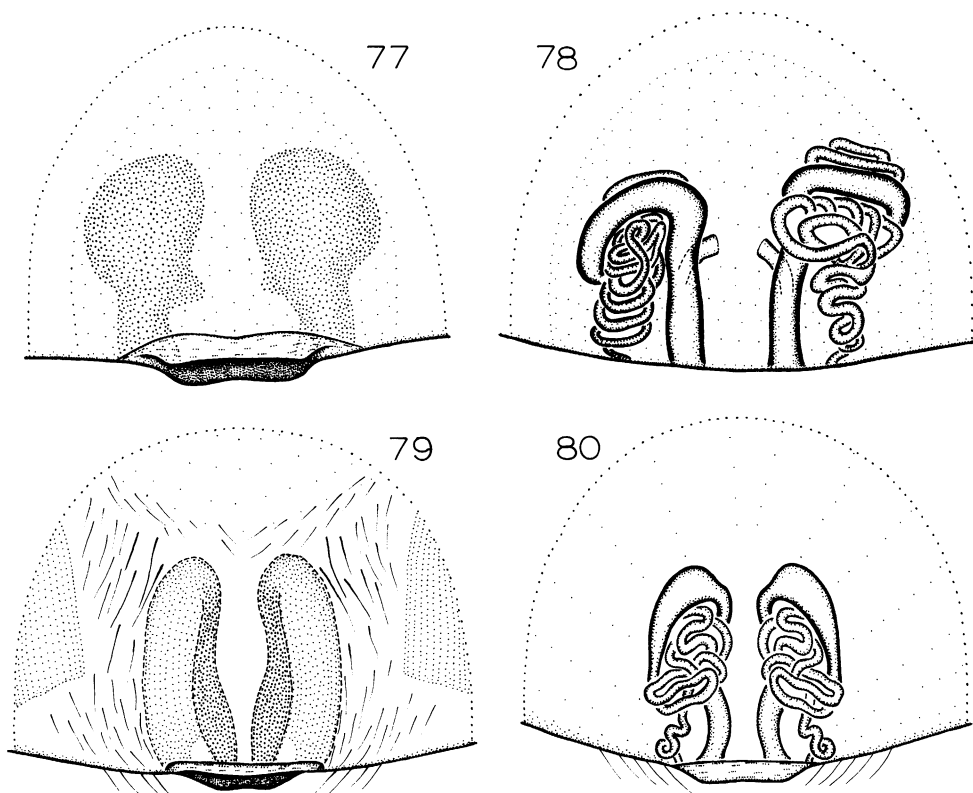
Diagnosis. Females of *Tivodrassus reddelli* may be distinguished by their large, widely separated median epigynal ducts (fig. 78).

Male. Unknown.

Female. Total length 4.43 mm. Carapace 1.94 mm. long, 1.62 mm. wide. Femur II 1.81 mm. long (holotype). Eye sizes and interdistances (mm.): AME 0.03, ALE 0.11, PME 0.07, PLE 0.07; AME-AME 0.08, AME-ALE 0.04, PME-PME 0.10, PME-PLE 0.09, ALE-PLE 0.03. MOQ length 0.15 mm., front width 0.14 mm., back width 0.24 mm. Median epigynal ducts wide, widely separated (figs. 77, 78). Leg spination (legs III missing): tibiae: I v1p4-0; II v1r-2-0; IV p1-0-1, r1-0-1; metatarsus IV v2-2-2.

Material Examined. Only the holotype.

Distribution. Querétaro, Mexico (map 3).



FIGS. 77-80. 77, 78. *Tivodrassus reddelli*, new species. 77. Epigynum, ventral view. 78. Vulva, dorsal view. 79, 80. *T. farias*, new species. 79. Epigynum, ventral view. 80. Vulva, dorsal view.

***Tivodrassus farias*, new species**

Figures 79, 80; Map 3

Type. Female holotype from Rancho del Cielo, 6 miles northwest of Gómez Farías, Tamaulipas, Mexico (March 9, 1969; J. Reddell, F. Howell, C. Tucker, S. Fowler, and V. Tipton), deposited in AMNH.

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Females of *Tivodrassus farias* may be distinguished by their long, externally visible median epigynal ducts (fig. 79).

Male. Unknown.

Female. Total length 2.34, 3.42 mm. Carapace 0.90, 1.37 mm. long, 0.86, 1.15 mm. wide. Femur II 1.15 mm. long (two specimens). Eye sizes and interdistances (mm.): AME 0.03, ALE 0.08, PME 0.07, PLE 0.07; AME-AME 0.05,

AME-ALE 0.02, PME-PME 0.05, PME-PLE 0.05, ALE-PLE 0.04. MOQ length 0.15 mm., front width 0.10 mm., back width 0.19 mm. Median epigynal ducts long, externally visible (figs. 79, 80). Leg spination: tibiae: I v1p-4-0; II v1r-1r-0; III, IV p1-0-1, v1p-2-2, r1-0-1; metatarsi: II v1r-2-0; IV p0-1-1, v1r-2-0.

Material Examined. Mexico: *San Luis Potosí*: 6-10 km. SW Aquismón, Nov. 23, 1972 (J. Reddell and E. Gonzales, AMNH), 1♀.

Distribution. Tamaulipas and San Luis Potosí, Mexico (map 3).

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